

Uji Pemahaman 1 (hal 7)

A. Pasangkan

1) $2x^3 - 3x^2 - 9x = x(2x+3)(x-3)$

Jawaban : E

2) $6x^3 + 7x^2 - 5x = x(2x-1)(3x+5)$

Jawaban : A

3) $2x^3 - 5x^2 - x + 6 = (x+1)(2x-3)(x-2)$

Jawaban : D

4) $6x^4 + 29x^3 + 16x^2 - 81x - 90$

$= (x^2 + 5x + 6)(2x+3)(3x-5)$

Jawaban : C

5) $8x^4 - 22x^3 - 63x^2 + 97x - 20$

$= (x^2 - 5x + 4)(4x-1)(2x+5)$

Jawaban : B

B. Pilihan ganda

1) $(x^3 - 4x^2 - 11)(x^3 + x - 2) = x^6 + \dots$

→ Polinom derajat 6

Jawaban : E

2) $P(x) = 2x^3 - 7x^2 + 11x - 4$

$P(\frac{1}{2}) = 0$

Jawaban : C

3) $P(x) = x^3 - 8 \rightarrow P(2) = 0$

$Q(x) = x^2 - 2x + 1 \rightarrow Q(2) = 1$

$\Rightarrow P(Q(2)) - Q(P(2)) = P(1) - Q(0)$

$= -7 - 1$

$= -8$

Jawaban : E

4) $P(x) = x^6 - x^5 \rightarrow P(-1) = 1 - (-1) = 2$

$Q(x) = x^7 - x^6 \rightarrow Q(-1) = -1 - 1 = -2$

$\Rightarrow P(-1) + Q(-1) = 2 + (-2) = 0$

Jawaban : C

5) $2x^3 + 11x^2 + 2x - 15 = (x+5)(x-1)(2x+3)$

Jawaban : D

C. Uraian

1) Pangkat turun

a.) $6x^2 + 2x + 7x^3 - 2 = 7x^3 + 6x^2 + 2x - 2$

b.) $x(2-x)(x-3) = -x^3 + 5x^2 - 6x$

c.) $(y+1)(y^2+y+5) = y^3 + 2y^2 + 6y + 5$

d.) $(z+2)(z+3)(z+4) = (z^2 + 5z + 6)(z+4)$
 $= z^3 + 9z^2 + 26z + 24$

2) a.) $(2x-1)(4-5x) = -10x^2 + 13x - 4$

\Rightarrow koefisien x adalah 13

b.) $(x-1)(2x-1)(x^2+x+1) = 2x^4 - x^3 - 2x + 1$

\Rightarrow koefisien x^2 adalah 0

c.) $(2x^2 - x - 8)(x^3 - 8x + 3) = 2x^5 - x^4 - 24x^3 + 14x^2 + 61x - 24$

\Rightarrow koefisien x^3 adalah -24

d.) $(4x-1)^2(x+3) = (16x^2 - 8x + 1)(x+3)$
 $= 16x^3 + 40x^2 - 23x + 3$

\Rightarrow koefisien x adalah -23

3) a.) $6x^2 + 25x - 9 = (3x-1)(2x+9)$

b.) $x^3 + x^2 - 6x = x(x+3)(x-2)$

c.) $3x^3 + 5x^2 - 11x + 3 = (x-1)(3x-1)(x+3)$

4) a.) $P(x) = 2x^3 - 3x^2 + x + 7$

$\Rightarrow P(2) = 2(8) - 3(4) + (2) + 7 = 13$

$\Rightarrow P(0) = 7$

$\Rightarrow P(-2) = 2(-8) - 3(4) + (-2) + 7 = -23$

b.) $P(x) = 2x^3 + x^2 - 3x + 4$

$\Rightarrow P(3) = 58$

$P(0) = 4$

$P(-3) = -32$

c.) $P(x) = x^n$

$\Rightarrow P(1) = 1 \quad \Rightarrow P(0) = 0 \quad \Rightarrow P(-1) = -1$

d.) $Q(x) = x^{13}$

$\Rightarrow Q(1) = 1 \quad \Rightarrow Q(0) = 0 \quad \Rightarrow Q(-1) = -1$

e.) $F(x) = (2x-3)^2 - x^2$

$\Rightarrow F(2) = (2(2)-3)^2 - (2)^2 = -3$

$\Rightarrow F(0) = 9$

$\Rightarrow F(-2) = 45$

f.) $F(x) = (3x-1)^2 + 2x^2$

$\Rightarrow F(4) = 153$

$F(0) = 1$

$F(-4) = 201$

g.) $P(x) = x^2 + 3x + 1 \rightarrow P(3) = 19$

$Q(x) = x^3 - 1 \rightarrow Q(2) = 7$

h.) $P(x) = x^6 - x^4 \rightarrow P(-1) = 0$

$Q(x) = x^7 - x^5 \rightarrow Q(-1) = 0$

5) a.) $P(x) = x+2, Q(x) = x+1$

$\Rightarrow P(Q(2)) = P(3) = 5$

$\Rightarrow Q(P(2)) = Q(4) = 5$

b.) $F(x) = x^2 - 3, G(x) = x+2$

$\Rightarrow F(G(0)) = F(2) = 1$

$\Rightarrow G(F(0)) = G(-3) = -1$

c.) $F(x) = 3x^2 + x, G(x) = x^2 - 1$

$\Rightarrow F(G(1)) = F(0) = 0$

$\Rightarrow G(F(1)) = G(4) = 15$

d.) $P(x) = 4x^3 - x, Q(x) = x^2 + 1$

$\Rightarrow P(Q(2)) = P(5) = 495$

$\Rightarrow Q(P(2)) = Q(30) = 901$

6) a.) $2(5)^2 - 11(5) + 10 = 5$

b.) $3(4)^2 - 13(4) + 4 = 0$

c.) $(1)^3 - 5(1)^2 - 2 = -6$

d.) $2(-1)^3 + (-1) - 5 = -8$

e.) $3(-2)^3 + (-2)^2 - 7(-2) = -6$

f.) $(-2)^3 + 4(-2)^2 + (-2) - 2 = 4$

g.) $-2(-3)^3 - 7(-3)^2 - (-3) + 6 = 0$

h.) $2^6 + 3(2)^3 - 2(2) - 1 = 83$

i.) $5\left(\frac{3}{2}\right)^3 + 6\left(\frac{3}{2}\right) - 7 = \frac{151}{8}$

j.) $(1)^6 - 1 = 0$

k.) $(-1)^6 + 1 = 2$

7) a.) $(2x+1)(3x-7) = Ax^2 + Bx - 7$

$6x^2 - 11x - 7 = Ax^2 + Bx - 7$

$\Rightarrow A = 6, B = -11$

$$b.) 3x^2 - 10x - 8 = (A+2)(x-B)$$

$$(3x+2)(x-4) = (Ax+2)(x-B)$$

$$\Rightarrow A = 3, B = 4$$

$$c.) -4x + 13 = A(2x-5) + B(3x-6)$$

$$-4x + 13 = (2A+3B)x + (-5A-6B)$$

$$\Rightarrow \begin{array}{l} 2A+3B = -4 \\ -5A-6B = 13 \end{array} \begin{array}{l} \times 2 \\ \times 1 \end{array}$$

$$\begin{array}{r} 4A+6B = -8 \\ -5A-6B = 13 \\ \hline -A = 5 \end{array}$$

$$\boxed{A = -5}$$

$$\Rightarrow 2(-5) + 3B = -4$$

$$\boxed{B = 2}$$

$$d.) 7x^2 - 8x - 10 = (Ax+B)(x-2) + (B+C)x$$

$$= Ax^2 + (-2A+B)x - 2B + (B+C)x$$

$$= Ax^2 + (-2A+2B+C)x - 2B$$

$$\Rightarrow A = 7, -2B = -10$$

$$B = 5$$

$$\Rightarrow -2(7) + 2(5) + C = -8$$

$$C = -4$$

$$e.) 11x^2 + 4x + 12 = A(x^2+4) + (Bx+C)(2x+1)$$

$$= Ax^2 + 4A + 2Bx^2 + (B+2C)x + C$$

$$= (A+2B)x^2 + (B+2C)x + (4A+C)$$

$$\Rightarrow \begin{array}{l} A+2B = 11 \\ B+2C = 4 \\ 4A+C = 12 \end{array}$$

$$\Rightarrow \begin{array}{r} B+2C = 4 \\ 8A+2C = 24 \\ \hline 8A-B = 20 \end{array}$$

$$\Rightarrow \begin{array}{r} A+2B = 11 \\ 16A-2B = 40 \\ \hline 17A = 51 \end{array}$$

$$\boxed{A = 3}$$

$$\Rightarrow \begin{array}{r} 2B = 11 - 3 \\ \hline B = 4 \end{array}$$

$$\Rightarrow \begin{array}{r} 4 + 2C = 4 \\ \hline C = 0 \end{array}$$

$$f.) A(x-2)(x+1) + B(x-1)(x+3) + C(x+2)(x-3)$$

$$= 9x + 17$$

$$A(x^2-x-2) + B(x^2+2x-3) + C(x^2-x-6)$$

$$= 9x + 17$$

$$\Rightarrow A+B+C = 0$$

$$-A+2B-C = 9$$

$$-2A-3B-6C = 17$$

$$\Rightarrow A+B+C = 0$$

$$-A+2B-C = 9$$

$$3B = 9$$

$$\boxed{B = 3}$$

$$\Rightarrow 2A+2B+2C = 0$$

$$-2A-3B-6C = 17$$

$$-B-4C = 17$$

$$-4C = 20$$

$$\boxed{C = -5}$$

$$\Rightarrow A + 3 - 5 = 0$$

$$\boxed{A = 2}$$

Uji Pemahaman 2 (hal 11)

1. $P(x) = 5x^2 + 4x + 3$, $P(-2) = 15$

Jawaban : E

2. $Q(x) = 5 - x^2 + 3x^4$, $Q(-1) = 7$

Jawaban : D

3. $F(x) = 2x^3 + x + 11$, $F(-1) = 8$

Jawaban : C

4. $P(x) = x^3 - 8x + 3$, $P(-3) = 0$

Jawaban : B

5. $F(x) = 7x^4 - 10x^2 - 15x - 49$, $F(2) = -7$

Jawaban : A

b. pilihan ganda

1. $P(x) = x^2 + x - 2$, $P(6) = -2$

Jawaban : A

2. $Q(x) = -2x^3 + 3x^2 - 4x + 5$, $Q(2) = -7$

Jawaban : D

3. $R(x) = 3x^4 - 2x^3 + x - 7$, $R(1) = -5$

Jawaban : B

4. $F(x) = x^5 + x^4 + ax^3 + 11x^2 - 9x + 4$

$F(1) = 1 + 1 + a + 11 - 9 + 4 = 5$

$a = -3$

$F(x) = x^5 + x^4 - 3x^3 + 11x^2 - 9x + 4$

$F(-1) = 27$

Jawaban : E

5. $P(x) = x^4 + ax^3 - 3x^2 + bx - 8$

$P(3) = 3^4 + a(3^3) - 3(3^2) + b(3) - 8 = -20$

$27a + 3b = -66$

$P(-2) = (-2)^4 + a(-2)^3 - 3(-2)^2 + b(-2) - 8 = 20$

$4a + b + 2 = -10$

$4a + b = -12$

$\Rightarrow 27a + 3b = -66$

$12a + 3b = -36$

$15a = -30$

$a = -2$

$\Rightarrow 4(-2) + b = -12$

$b = -4$

$\Rightarrow a \cdot b = (-2)(-4) = 8$

Jawaban : C

c. uraian

1.
$$\begin{array}{r|rrrr} 2 & 5 & 4 & 3 & \\ & & 10 & 28 & \\ \hline & 5 & 14 & 31 & \end{array} \quad P(2) = 31$$

2.
$$\begin{array}{r|rrrrrr} -1 & 3 & 0 & -1 & 0 & 5 & \\ & & -3 & 3 & -2 & 2 & \\ \hline & 3 & -3 & 2 & -2 & 7 & \end{array} \quad P(-1) = 7$$

3.
$$\begin{array}{r|rrrr} 1 & 1 & -1 & 0 & -11 & \\ & & 1 & 0 & a & \\ \hline & 1 & 0 & 0 & -11 & \end{array} \quad P(1) = -11$$

4.
$$\begin{array}{r|rrrr} -3 & 1 & 0 & -8 & 3 & \\ & & -3 & 9 & -3 & \\ \hline & 1 & -3 & 1 & 0 & \end{array} \quad P(-3) = 0$$

5.
$$\begin{array}{r|rrrrrr} -2 & 5 & 0 & -21 & 16 & 2 & \\ & & -10 & 20 & 2 & -36 & \\ \hline & 5 & -10 & -1 & 18 & -34 & \end{array} \quad P(-2) = -34$$

6.
$$\begin{array}{r|rrrr} -1 & 5 & 0 & 7 & 3 & 1 & \\ & & -5 & 5 & -12 & 9 & \\ \hline & 5 & -5 & 12 & -9 & 10 & \end{array} \quad P(-1) = 10$$

$$\boxed{7} \quad 5 \quad \begin{array}{r|rrrr} 1 & 4 & -7 & 3 \\ & 5 & 45 & 190 \\ \hline 1 & 9 & 38 & 193 \end{array} \quad F(5) = 193$$

$$\boxed{8} \quad 2 \quad \begin{array}{r|rrrr} 1 & 7 & -4 & 3 \\ & 2 & 18 & 28 \\ \hline 1 & 9 & 14 & 31 \end{array} \quad F(2) = 31$$

$$\boxed{9} \quad \frac{1}{2} \quad \begin{array}{r|rrrr} 8 & -22 & 9 \\ & 4 & -9 \\ \hline 8 & -18 & 0 \end{array} \quad P\left(\frac{1}{2}\right) = 0$$

$$\boxed{10} \quad -\frac{1}{3} \quad \begin{array}{r|rrrr} 1 & 0 & -1 & 1 \\ & -\frac{1}{3} & \frac{1}{9} & \frac{8}{27} \\ \hline 1 & -\frac{1}{3} & -\frac{8}{9} & \frac{35}{27} \end{array} \quad P\left(-\frac{1}{3}\right) = \frac{35}{27}$$

$$\boxed{11} \quad 3 \quad \begin{array}{r|rrrr} 4 & -3 & -5 \\ & 12 & 27 \\ \hline 4 & 9 & 22 \end{array}$$

$$\boxed{12} \quad 3 \quad \begin{array}{r|rrrr} 1 & 4 & -7 \\ & 3 & 21 \\ \hline 1 & 7 & 14 \end{array}$$

$$\boxed{13} \quad -2 \quad \begin{array}{r|rrrr} 1 & -3 & 0 & 7 \\ & -2 & 10 & -20 \\ \hline 1 & -5 & 10 & -13 \end{array}$$

$$\boxed{14} \quad -1 \quad \begin{array}{r|rrrrr} 1 & -2 & -3 & -4 & -8 \\ & -1 & 3 & 0 & 4 \\ \hline 1 & -3 & 0 & -4 & -4 \end{array}$$

$$\boxed{15} \quad -3 \quad \begin{array}{r|rrrrr} 3 & -4 & -21 & 0 & -7 \\ & -9 & 39 & -54 & 162 \\ \hline 3 & -13 & 18 & -54 & 155 \end{array}$$

$$\boxed{16} \quad -2 \quad \begin{array}{r|rrrr} 5 & -2 & 3 & -4 \\ & -10 & 24 & -54 \\ \hline 5 & -12 & 27 & -58 \end{array}$$

$$\boxed{17} \quad 4 \quad \begin{array}{r|rrrr} -7 & 3 & -2 & 4 \\ & -28 & -100 & -408 \\ \hline -7 & -25 & -102 & -404 \end{array}$$

$$\boxed{18} \quad 5 \quad \begin{array}{r|rrrr} 4 & 4 & -13 & 5 \\ & 20 & 120 & 535 \\ \hline 4 & 24 & 107 & 540 \end{array}$$

$$\boxed{19} \quad -1 \quad \begin{array}{r|rrrrr} 2 & -7 & -3 & -4 & -8 \\ & -2 & 9 & -6 & 10 \\ \hline 2 & -9 & 6 & -10 & 2 \end{array}$$

$$\boxed{20} \quad 4 \quad \begin{array}{r|rrrr} 2 & -3 & -20 & -6 \\ & 8 & 20 & 0 \\ \hline 2 & 5 & 0 & -6 \end{array}$$

Uji Pemahaman 3 (hal 14)

$$1) 2^3 + p(2)^2 + 3(2) + 2 = 0$$

$$4p = -16$$

$$p = -4$$

Jawaban : E

$$2) 8\left(\frac{3}{2}\right)^3 - 18\left(\frac{3}{2}\right)^2 + \frac{3}{2}p + 30 = 0$$

$$\frac{3}{2}(p+11) = 0$$

$$3p = -33$$

$$p = -11$$

Jawaban : A

$$3) P(x) = 3x^3 - 5x^2 - 42x - 40$$

$$= (3x+4)(x^2-3x-10)$$

Jawaban : A

$$4) P(x) = 4x^3 - 3x^2 + Kx + 42$$

$$P(2) = 2(K+31) = 0$$

$$K = -31$$

$$\Rightarrow P(x) = 4x^3 - 3x^2 - 31x + 42$$

$$= (x-2)(x+3)(4x-7)$$

Jawaban : E

$$5) 2x^3 - 9x^2 + 19x - 16 = (x^2 - x + 1)(2x - 7) + (10x - 9)$$

Jawaban : C

B. Uraian $P(x) = D(x) \cdot H(x) + S$

$$1) 7x + 9 = (x-3)(7) + 30$$

$$2) 4x^2 - 3x - 8 = (x-3)(4x+9) + 19$$

$$3) 3 \begin{array}{r|rrrr} & 1 & -2 & 0 & 9 \\ & & 3 & 3 & 9 \\ \hline & 1 & 1 & 3 & 18 \end{array}$$

$$x^3 - 2x^2 + 9 = (x-3)(x^2 + x + 3) + 18$$

$$4) 2 \begin{array}{r|rrrrr} & 1 & 4 & -7 & 3 & -24 \\ & & 2 & 12 & 10 & 26 \\ \hline & 1 & 6 & 5 & 13 & 2 \end{array}$$

$$x^4 + 4x^3 - 7x^2 + 3x - 24 = (x-2)(x^3 + 6x^2 + 5x + 13) + 2$$

$$5) 3 \begin{array}{r|rrrr} & 1 & 4 & -18 & 9 \\ & & 3 & 21 & 9 \\ \hline & 1 & 7 & 3 & 18 \end{array}$$

$$x^3 + 4x^2 - 18x + 9 = (x-3)(x^2 + 7x + 3) + 18$$

$$6) 3 \begin{array}{r|rrrrr} & 1 & -3 & -7 & 13 & -2 \\ & & 3 & 0 & -21 & -24 \\ \hline & 1 & 0 & -7 & -8 & -26 \end{array}$$

$$x^4 - 3x^3 - 7x^2 + 13x - 2 = (x-3)(x^3 - 7x - 8) + (-26)$$

$$7) 5 \begin{array}{r|rrrr} & 1 & 2 & -25 & -50 \\ & & 5 & 35 & 50 \\ \hline & 1 & 7 & 10 & 0 \end{array}$$

$$x^3 + 2x^2 - 25x - 50 = (x-5)(x^2 + 7x + 10)$$

$$8) a) -1 \begin{array}{r|rrrrr} & 2 & -6 & 5 & 7 & 12 \\ & & -2 & 8 & -13 & 6 \\ \hline & 2 & -8 & 13 & -6 & 18 \end{array}$$

$$2x^4 - 6x^3 + 5x^2 + 7x + 12 = (x+1)(2x^3 - 8x^2 + 13x - 6) + 18$$

$$b) 1 \begin{array}{r|rrrrr} & 2 & -6 & 5 & 7 & 12 \\ & & 2 & -4 & 1 & 8 \\ \hline & 2 & -4 & 1 & 8 & 20 \end{array}$$

$$2x^4 - 6x^3 + 5x^2 + 7x + 12 = (x-1)(2x^3 - 4x^2 + x + 8) + 20$$

$$9) a) 2 \begin{array}{r|rrrrr} & 2 & -3 & -4 & -5 & -8 \\ & & 4 & 2 & -4 & -18 \\ \hline & 2 & 1 & -2 & -9 & -26 \end{array}$$

$$2x^4 - 3x^3 - 4x^2 - 5x - 8 = (x-2)(2x^3 + x^2 - 2x - 9) + (-26)$$

$$\begin{array}{r|rrrrr} 2 & 2 & -3 & -4 & -5 & -8 \\ & & -2 & 5 & -1 & 6 \\ \hline & 2 & -5 & 1 & -6 & -2 \end{array}$$

$$2x^4 - 3x^3 - 4x^2 - 5x - 8 = (x+1)(2x^3 - 5x^2 + x - 6) + (-2)$$

$$\begin{array}{r|rrrrr} 2 & 2 & -1 & -18 & 0 & -7 \\ & & -6 & 21 & -9 & 27 \\ \hline & 2 & -7 & 3 & -9 & 20 \end{array}$$

$$2x^4 - x^3 - 18x^2 - 7 = (x+3)(2x^3 - 7x^2 + 3x - 9) + 20$$

$$\begin{array}{r|rrrrr} 3 & 2 & -1 & -18 & 0 & -7 \\ & & 6 & 15 & -9 & -27 \\ \hline & 2 & 5 & -3 & -9 & -34 \end{array}$$

$$2x^4 - x^3 - 18x^2 - 7 = (x-3)(2x^3 + 5x^2 - 3x - 9) + (-34)$$

$$\begin{array}{r|rrrrr} 2 & 3 & 0 & 0 & -7 & -20 \\ & & 6 & 12 & 24 & 34 \\ \hline & 3 & 6 & 12 & 17 & 14 \end{array}$$

$$3x^4 - 7x - 20 = (x-2)(3x^3 + 6x^2 + 12x + 17) + 14$$

$$\begin{array}{r|rrrrr} -2 & 3 & 0 & 0 & -7 & -20 \\ & & -6 & 12 & -24 & 62 \\ \hline & 3 & -6 & 12 & -31 & 42 \end{array}$$

$$3x^4 - 7x - 20 = (x+2)(3x^3 - 6x^2 + 12x - 31) + 42$$

$$\begin{array}{r|rrrrr} 4 & 2 & -3 & -21 & 0 & -7 \\ & & 8 & 20 & -4 & -16 \\ \hline & 2 & 5 & -1 & -4 & -23 \end{array}$$

$$2x^4 - 3x^3 - 21x^2 - 7 = (x-4)(2x^3 + 5x^2 - x - 4) + (-23)$$

$$\begin{array}{r|rrrrr} -3 & 2 & -3 & -21 & 0 & -7 \\ & & -6 & 27 & -18 & 54 \\ \hline & 2 & -9 & 6 & -18 & 47 \end{array}$$

$$2x^4 - 3x^3 - 21x^2 - 7 = (x+3)(2x^3 - 9x^2 + 6x - 18) + 47$$

$$\begin{array}{r|rrrr} 2 & 1 & -8 & -3 \\ & & 2 & -12 \\ \hline & 1 & -6 & -15 = P(2) \end{array}$$

$$a) \text{ Sisa} = -15$$

$$b) P(2) = -15$$

$$\begin{array}{r|rrrr} -2 & 1 & -4 & 1 & 3 \\ & & -2 & 12 & -26 \\ \hline & 1 & -6 & 13 & -23 \end{array} \rightarrow \text{Sisa} = f(-2) = -23$$

$$\begin{array}{r|rrrr} 3 & 1 & -2 & 3 & -4 \\ & & 3 & 3 & 18 \\ \hline & 1 & 1 & 6 & 14 \end{array}$$

$$\text{Sisa} = f(3) = 14$$

$$\begin{array}{r|rrrrr} 1 & 2 & -5 & 7 & 0 & -6 \\ & & 2 & -3 & 4 & 4 \\ \hline & 2 & -3 & 4 & 4 & -2 \end{array}$$

$$\text{Sisa} = P(1) = -2$$

$$17) P(x) = x^3 - 2x^2 - x + 2$$

$$a) P(2) = 2^3 - 2(2)^2 - 2 + 2 = 0 \text{ (qed)}$$

$$b) x^3 - 2x^2 - x + 2 = (x-2)(x-1)(x+1)$$

$$18) f(x) = x^3 + 4x^2 + x - 6 = (x-1)(x+2)(x+3)$$

$$\rightarrow f(1) = f(-2) = f(-3) = 0$$

$$f(-1) = -4$$

$$f(2) = 20$$

$$f(3) = 60$$

$$19) P(x) = x^3 + 2x^2 - 5x - 6 = (x-2)(x+1)(x+3)$$

$$20) a) (-2)^4 - 16 = 0$$

$$b) (-2)^5 + 32 = 0$$

$$c) (3)^4 - 81 = 0$$

$$\Rightarrow f(x) = 0 \text{ maka } x \text{ adalah faktor dari } f(x)$$

Uji Pemahaman 4(hal 16)

11 $P(x) = x^5 + x^4 - 3x^3 + 10x^2 - 8x + 3$

$P(-1) = 24$

Jawaban : E

12 $Q(x) = x^3 + Kx - 4$

$Q(-4) = (-4)^3 + (-4)K - 4 = 0$

$-4K = 68$

$K = -17$

$\Rightarrow Q(x) = x^3 - 17x - 4$

$$\begin{array}{r|rrrr} 4 & 1 & 0 & -17 & -4 \\ & & 4 & 16 & -4 \\ \hline & 1 & 4 & -1 & -8 \end{array}$$

Hasil bagi = $x^2 + 4x - 1$

Jawaban : C

13 $R(x) = 5x^3 - 2ax^2 + 3x - 2a$

$R(3) = 5(3)^3 - 2a(3)^2 + 3(3) - 2a = 44$

$-20a = -100$

$a = 5$

Jawaban : D

14 $F(x) = x^3 - (a-1)x^2 + bx + 2a$

$F(2) = 8 - 4(a-1) + 2b + 2a = 4$

$-2a + 2b = -8$

$F(-2) = -8 - 4(a-1) - 2b + 2a = 0$

$-2a - 2b = 4$

$-2a + 2b = -8$

$-2a - 2b = 4$

$4b = -12$

$b = -3$

$-2a = -2$

$a = 1$

Jawaban : D

15 $P(x) = x^3 - mx^2 + nx + 4$

$P(-3) = (-3)^3 - m(-3)^2 + n(-3) + 4 = -90$

$-9m - 3n = -67$

$P(2) = 2^3 - m(2)^2 + n(2) + 4 = 0$

$-4m + 2n = -12$

$$\begin{array}{r|l} -9m - 3n = -67 & \times 2 \\ -4m + 2n = -12 & \times 3 \\ \hline -18m - 6n = -134 \\ -12m + 6n = -36 \\ \hline -30m = -170 \end{array}$$

$m = \frac{17}{3}$

$-9\left(\frac{17}{3}\right) - 3n = -67$

$-3n = -16$

$n = \frac{16}{3}$

$\Rightarrow m^2 - n^2 = \left(\frac{17}{3}\right)^2 - \left(\frac{16}{3}\right)^2 = \frac{289}{9} - \frac{256}{9}$

$= \frac{33}{9}$

$= \frac{11}{3}$

Jawaban : E

B. Uraian

1 $\begin{array}{r|rrr} 4 & 3 & -11 & 13 \\ & & 12 & 4 \\ \hline & 3 & 1 & 17 \end{array}$

Hasil bagi $3x + 1$

Sisa = 17

2 $\begin{array}{r|rrr} 2 & 3 & -5 & -3 \\ & & 6 & 2 \\ \hline & 3 & 1 & -1 \end{array}$

Hasil bagi $3x + 1$

Sisa = -1

3 $\begin{array}{r|rrrr} -1 & 3 & -2 & 1 & 4 \\ & & -3 & 5 & -6 \\ \hline & 3 & -5 & 6 & -2 \end{array}$

Hasil bagi = $3x^2 - 5x + 6$

Sisa = -2

$$\begin{array}{r|rrrr} 4 & 2 & -4 & 3 & -6 \\ & & 4 & 0 & 6 \\ \hline & 2 & 0 & 3 & 0 \end{array}$$

Hasil bagi = $2x^2 + 3$

Sisa = 0

$$\begin{array}{r|rrrr} 5 & 5 & 3 & -7 & 11 \\ & & -20 & 68 & -244 \\ \hline & 5 & -17 & 61 & -233 \end{array}$$

Hasil bagi = $5x^2 - 17x + 61$

Sisa = -233

$$\begin{array}{r|rrrrr} 16 & 2 & -2 & 4 & 5 & 0 \\ & & 4 & 4 & 16 & 42 \\ \hline & 2 & 2 & 8 & 21 & 42 \end{array}$$

Hasil bagi = $2x^3 + 2x^2 + 8x + 21$

Sisa = 42

$$\begin{array}{r|rrrrr} 7 & 1 & -1 & 8 & -16 & -28 \\ & & 4 & 12 & 80 & 256 \\ \hline & 1 & 3 & 20 & 64 & 228 \end{array}$$

Hasil bagi = $x^3 + 3x^2 + 20x + 64$

Sisa = 228

$$\begin{array}{r|rrrrrr} 8 & 1 & -1 & 1 & -1 & 1 & -1 \\ & & 1 & 0 & 1 & 0 & 1 \\ \hline & 1 & 0 & 1 & 0 & 1 & 0 \end{array}$$

Hasil bagi = $x^4 + x^2 + 1$

Sisa = 0

$$\begin{array}{r|rrrrrr} 9 & 5 & -20 & 23 & -19 & 11 & -3 \\ & & 15 & -15 & 24 & 15 & 78 \\ \hline & 5 & -5 & 8 & 5 & 26 & 75 \end{array}$$

Hasil bagi = $5x^4 - 5x^3 + 8x^2 + 5x + 26$

Sisa = 75

$$\begin{array}{r|rrrrrr} 10 & 1 & 0 & 0 & 3 & 0 & -2 & -1 \\ & & 2 & 4 & 8 & 22 & 44 & 84 \\ \hline & 1 & 2 & 4 & 11 & 22 & 42 & 83 \end{array}$$

Hasil bagi = $x^5 + 2x^4 + 4x^3 + 11x^2 + 22x + 42$

Sisa = 83

Uji Pemahaman 5 (hal 18)

A. Pasangkan

$$11) 2x^2 - 11x + 8 = (2x-1)(x-5) + 3$$

Jawaban: E

$$12) 8x^2 + 2x - 13 = (2x+1)(4x-1) + (-12)$$

Jawaban: B

$$13) 9x^2 - 6x - 10 = (3x+1)(3x-3) + (-7)$$

Jawaban: A

$$14) 9x^2 - 15x + 8 = (3x-4)(3x-1) + 4$$

Jawaban: C

$$15) 8x^2 - 12x - 56 = (2x+3)(4x-12) + (-20)$$

Jawaban: D

B. pilihan ganda

$$11) 6x^3 - 7x^2 + x - 5 = (2x-3)(3x^2 + x + 2) + 1$$

Jawaban: C

$$12) 2x^3 + x^2 + 4x + 4 = (2x-3)(x^2 + 2x + 5) + 19$$

Jawaban: C

$$13) 2x^3 - 5x^2 + 8x + 2 = (2x-1)(x^2 - 2x + 3) + 5$$

Jawaban: C

$$14) 6x^3 - x^2 - 15x + 8 = (3x+4)(2x^2 - 3x - 1) + 12$$

Jawaban: A

$$15) 10x^3 - 13x^2 - 47x + 69 = (5x+11)(2x^2 - 7x + 6) + 3$$

Jawaban: C

$$16) 2x^5 - 3x^4 + 8x^3 - x^2 + 9x + 13$$

$$= (2x+1)(x^4 - 2x^3 + 5x^2 - 3x + 6) + 7$$

Jawaban: B

$$17) 4x^5 + 7x^4 - 8x^3 - 18x^2 + 9x - 19$$

$$= (4x+7)(x^4 - 2x^2 - x + 4) + (-47)$$

Jawaban: B

$$18) Q(x) = 6x^3 + Kx^2 + 4x - 1$$

$$Q\left(\frac{1}{3}\right) = \frac{1}{9}(K+5) = 0$$

$$K = -5$$

$$\Rightarrow Q(x) = 6x^3 - 5x^2 + 4x - 1$$

$$= [(3x-1)(2x+5)](x-3) + (48x-16)$$

Jawaban: C

$$19) R(x) = 5x^3 - (5a-3)x^2 + 3x + 2a$$

$$R\left(\frac{2}{5}\right) = 5\left(\frac{2}{5}\right)^3 - (5a-3)\left(\frac{2}{5}\right)^2 + 3\left(\frac{2}{5}\right) + 2a = 8$$

$$\frac{6a}{5} + 2 = 8$$

$$\frac{6a}{5} = 6$$

$$a = 5$$

Jawaban: D

$$10) F(x) = 4x^3 - (2a-6)x^2 + (12b-12)x - 5a$$

$$F\left(\frac{3}{2}\right) = -\frac{19}{2}a + 18b = -37 \quad \times 5$$

$$F\left(-\frac{5}{2}\right) = -\frac{35a}{2} - 30b = -5 \quad \times 3$$

$$\Rightarrow -\frac{95}{2}a + 90b = -185$$

$$-\frac{105a}{2} - 90b = -15$$

$$-100a = -200$$

$$a = 2$$

$$b = \frac{-37 + 19}{18} = -1$$

$$\Rightarrow a - b = 2 - (-1) = 3$$

Jawaban: E

C. Uraian

$$\begin{array}{r} \boxed{1} \quad \frac{1}{3} \quad \begin{array}{r|rrr} 3 & -11 & 7 \\ & 1 & -\frac{10}{3} \\ \hline 3 & -10 & \frac{11}{3} \end{array} \end{array}$$

Hasil bagi: $(x - \frac{10}{3})$ & sisa = $\frac{11}{3}$

$$\boxed{2} \quad -\frac{1}{2} \quad \begin{array}{r|rrr} 6 & 7 & -8 \\ & -3 & -2 \\ \hline 6 & 4 & -10 \end{array}$$

Hasil bagi: $(3x + 2)$ & sisa = -10

$$\boxed{3} \quad -\frac{1}{3} \quad \begin{array}{r|rrr} 9 & -12 & -10 \\ & -3 & 5 \\ \hline 9 & -15 & -5 \end{array}$$

Hasil bagi: $(3x - 5)$ & sisa = -5

$$\boxed{4} \quad \frac{4}{3} \quad \begin{array}{r|rrr} 6 & -11 & 8 \\ & 8 & -4 \\ \hline 6 & -3 & 4 \end{array}$$

Hasil bagi: $(2x - 1)$ & sisa = 4

$$\boxed{5} \quad -\frac{1}{3} \quad \begin{array}{r|rrrr} 18 & 9 & 5 & 2 \\ & -6 & -1 & -\frac{4}{3} \\ \hline 18 & 3 & 4 & \frac{2}{3} \end{array}$$

Hasil bagi: $(6x^2 + x + \frac{4}{3})$ & sisa = $\frac{2}{3}$

$$\boxed{6} \quad \frac{3}{2} \quad \begin{array}{r|rrrr} 2 & 1 & 4 & 4 \\ & 3 & 6 & 15 \\ \hline 2 & 4 & 10 & 19 \end{array}$$

Hasil bagi: $(x^2 + 2x + 5)$ & sisa = 19

$$\boxed{7} \quad -\frac{1}{3} \quad \begin{array}{r|rrrr} 3 & 7 & -13 & 8 \\ & -1 & -2 & 5 \\ \hline 3 & 6 & -15 & 13 \end{array}$$

Hasil bagi: $(x^2 + 2x - 5)$ & sisa = 13

$$\boxed{8} \quad -\frac{4}{3} \quad \begin{array}{r|rrrr} 6 & -1 & -15 & 8 \\ & -8 & 12 & 4 \\ \hline 6 & -9 & -3 & 12 \end{array}$$

Hasil bagi: $(2x^2 - 3x - 1)$ & sisa = 12

$$\boxed{9} \quad -\frac{1}{2} \quad \begin{array}{r|rrrrr} 2 & 5 & 0 & -7 & -14 \\ & -1 & -2 & 1 & 3 \\ \hline 2 & 4 & -2 & -6 & -11 \end{array}$$

Hasil bagi: $(x^3 + 2x^2 - x - 3)$ & sisa = -11

$$\boxed{10} \quad -\frac{3}{2} \quad \begin{array}{r|rrrrr} 2 & 5 & 3 & 8 & 12 \\ & -3 & -3 & 0 & -12 \\ \hline 2 & 2 & 0 & 8 & 0 \end{array}$$

Hasil bagi: $(x^3 + x^2 + 4)$ & sisa = 0

$$\boxed{11} \quad \frac{1}{2} \quad \begin{array}{r|rrrrr} 6 & -17 & 13 & -15 & a \\ & 3 & -7 & 3 & -6 \\ \hline 6 & -14 & 6 & -12 & a-6 \end{array}$$

$a - 6 = 0 \Rightarrow a = 6$

$$\boxed{12} \quad -\frac{3}{2} \quad \begin{array}{r|rrrr} 6 & -1 & -9 & a \\ & -9 & 15 & -9 \\ \hline 6 & -10 & 6 & a-9 \end{array}$$

Hasil bagi: $(3x^2 - 5x + 3)$

$$\boxed{13} \quad -\frac{1}{2} \quad \begin{array}{r|rrrr} 2 & -5 & -a & 7 \\ & -1 & 3 & \frac{a-3}{2} \\ \hline 2 & -6 & -a+3 & \frac{7+a-3}{2} \end{array}$$

$\Rightarrow 7 + \frac{a-3}{2} = 0$
 $a - 3 = -14$
 $a = -11$

$$\boxed{14} \quad -\frac{5}{2} \quad \begin{array}{r|rrrr} 2 & a & -22 & -105 \\ & -5 & -\frac{5a+5}{2} & \frac{25a+95}{4} \\ \hline 2 & a-5 & -\frac{5a+19}{2} & \frac{25a+95}{4} \end{array}$$

$\Rightarrow \frac{25a}{4} = \frac{105-95}{4}$
 $25a = 325$
 $a = 13$

$$\boxed{15} \quad -2 \quad \begin{array}{r|rrrr} 3 & 7 & -m & -6 \\ & -6 & -2 & 2m+4 \\ \hline 3 & 1 & -m-2 & 2m-2 \end{array}$$

$\Rightarrow 2m - 2 = 0$
 $2m = 2$
 $m = 1$

Uji Pemahaman 6 (hal 22)

A Pilihan ganda

$$1) x^5 - 3x^4 + 2x^3 + 4x - 9 = (x^2 - 5x + 6)(x^3 + 2x^2 + 6x + 18) + (50x - 117)$$

Jawaban: E

$$2) x^5 - 3 = (x^2 - x - 2)(x^3 + x^2 + 3x + 5) + (11x + 7)$$

Jawaban: B

$$3) (x^2 + 2x - 15) = (x + 5)(x - 3)$$

$$Q(x) = 3x^3 + Kx^2 - 39x - 45$$

$$Q(-5) = 25(K - 9) = 0$$

$$K = 9$$

$$3x^3 + 9x^2 - 39x - 45 = (x^2 - 2x - 15)(3x + 15) + (36x + 180)$$

Jawaban: D

$$4) R(x) = 5x^3 - (a+1)x^2 - 25x + 6a$$

$$x^2 - 5 = (x + \sqrt{5})(x - \sqrt{5})$$

$$\rightarrow R(\sqrt{5}) = a - 5 = 8$$

$$a = 13$$

Jawaban: D

$$5) F(x) = 2x^3 + (a+2)x^2 - (3b-2)x + 2a$$

$$x^2 - x - 6 = (x - 3)(x + 2)$$

$$F(-2) = a + b + 2 = 0$$

$$b = 2 - a$$

$$F(3) = -11a + 9b = 78$$

$$9b = 78 + 11a$$

$$\Rightarrow 9(2 - a) = 78 + 11a \quad \text{or} \quad b = 2 - (-3)$$

$$18 - 9a = 78 + 11a$$

$$= 5$$

$$-60 = 20a$$

$$-3 = a$$

$$\Rightarrow b - a = 5 - (-3) = 8$$

Jawaban: E

$$6) P(-1) = -p + q = 10 \quad \Rightarrow -1 + q = 10$$

$$P(3) = 3p + q = 14 \quad q = 11$$

$$\underline{-4p = -4}$$

$$p = 1$$

$$\Rightarrow P(x) : (x^2 - 2x - 3) \text{ sisanya } x + 11$$

Jawaban: B

$$7) P(2) = 2p + q = 6 \quad \Rightarrow p + q = -13$$

$$P(1) = p + q = -13 \quad q = -32$$

$$\underline{p = 19}$$

$$\Rightarrow P(x) : (x^2 - 3x + 2) \text{ bersisa } 19x - 32$$

Jawaban: C

$$8) P(2) = 2p + q = 37 \quad \Rightarrow 2 + q = 37$$

$$P(7) = 7p + q = 42 \quad q = 35$$

$$\underline{5p = 5}$$

$$p = 1$$

$$\Rightarrow P(x) : (x^2 - 9x + 14) \text{ bersisa } x + 35$$

Jawaban: A

$$9) P(3) = 3p + q = 30 \quad \Rightarrow q = 24$$

$$P(1) = p + q = 26$$

$$\underline{2p = 4}$$

$$p = 2$$

$$\Rightarrow P(x) : (x^2 - 4x + 3) \text{ bersisa } 2x + 24$$

Jawaban: A

$$10) P(4) = 4p + q = 15 \quad \Rightarrow 8 + q = 15$$

$$P(6) = 6p + q = 19 \quad q = 7$$

$$\underline{2p = 4}$$

$$p = 2$$

$$\Rightarrow P(x) : (x^2 - 10x + 24) \text{ bersisa } 2x + 7$$

Jawaban: B

B. Vraien

1

a. $x^2 - 3x + 2 = (x-2)(x-1)$

$$\begin{array}{r|rrrr} 2 & 1 & -3 & 2 & \\ & & 2 & -8 & -10 \\ \hline 1 & 1 & -4 & -5 & -12 \\ & & 1 & -5 & \\ & & & -8 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= -8(x-2) - 12 \\ &= -8x + 16 - 12 \\ &= -8x + 4 \end{aligned}$$

b. $(x^2 - 9) = (x-3)(x+3)$

$$\begin{array}{r|rrrr} 3 & 1 & 0 & -9 & \\ & & 3 & 9 & 27 \\ \hline -3 & 1 & 3 & 0 & -27 \\ & & -3 & -9 & \\ & & & 9 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= 9(x-3) + 27 \\ &= 9x - 27 + 27 \\ &= 9x \end{aligned}$$

c. $x^2 - x - 2 = (x-2)(x+1)$

$$\begin{array}{r|rrrr} 2 & 1 & -1 & -2 & \\ & & 2 & 4 & 8 \\ \hline -1 & 1 & -2 & -4 & -6 \\ & & 1 & 3 & 6 \\ & & & 18 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= 18(x-2) + 36 \\ &= 18x - 36 + 36 \\ &= 18x \end{aligned}$$

d. $(x^2 + x - 6) = (x-2)(x+3)$

$$\begin{array}{r|rrrr} 2 & 1 & 1 & -6 & \\ & & 2 & 4 & -12 \\ \hline -3 & 1 & 3 & -2 & 18 \\ & & -3 & -9 & \\ & & & -11 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= -11(x-2) + 22 \\ &= -11x + 22 + 22 \\ &= -11x + 44 \end{aligned}$$

e. $(x^2 + 2x - 3) = (x-1)(x+3)$

$$\begin{array}{r|rrrr} 1 & 1 & 2 & -3 & \\ & & 1 & 3 & 3 \\ \hline -3 & 1 & 3 & 0 & -9 \\ & & -3 & -9 & \\ & & & -18 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= -18(x-1) + 18 \\ &= -18x + 18 + 18 \\ &= -18x + 36 \end{aligned}$$

f. $(x^2 + 2x - 15) = (x-3)(x+5)$

$$\begin{array}{r|rrrr} 3 & 1 & 2 & -15 & \\ & & 3 & 6 & -45 \\ \hline -5 & 1 & 5 & -10 & 15 \\ & & -5 & -25 & \\ & & & -35 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= -35(x-3) + 105 \\ &= -35x + 105 + 105 \\ &= -35x + 210 \end{aligned}$$

g. $(2x^2 - 7x - 4) = (2x+1)(x-4)$

$$\begin{array}{r|rrrr} 2 & 2 & -7 & -4 & \\ & & 2 & 8 & 12 \\ \hline -1 & 2 & -9 & -8 & -16 \\ & & -1 & -9 & \\ & & & 1 & \end{array}$$

$$\begin{aligned} \text{SISZ} &= 1(x-4) + 4 \\ &= x - 4 + 4 \\ &= x \end{aligned}$$

$$\begin{array}{r} x^2 - 2x - 4 \\ x^2 + 4 \quad \overline{) \quad x^4 - 2x^2 + 5} \\ \underline{x^2 + 4x^2} \\ -2x^3 - 4x^2 + 5 \\ \underline{-2x^3 - 8x^2} \\ -4x^2 + 8x + 5 \\ \underline{-4x^2 + 16x} \\ 8x + 21 \end{array}$$

$$\text{SISZ} = 8x + 21$$

2. $f(x) = x^4 + 2x^3 - 8x^2 + ax + b$

$$(x^2 + x - 12) = (x+4)(x-3)$$

$$\Rightarrow f(-4) = b - 4a = 0 \quad \rightarrow \quad b = 4a$$

$$f(3) = 3a + b + 63 = 0$$

$$\Rightarrow 3a + 4a = -63 \quad \Rightarrow b = 4(-9)$$

$$7a = -63 \quad = -36$$

$$a = -9$$

$$\therefore a = -9, b = -36$$

$$\begin{array}{r} -2 \mid 1 \quad (-2+1) \quad b \quad 2a \\ \quad -2 \quad 2a+2 \quad -4a-2b-4 \\ \hline 1 \quad -2-1 \quad 2a+b+2 \quad -2a-2b-4 = 0 \end{array}$$

$$\begin{array}{r} 2 \mid 1 \quad (-2+1) \quad b \quad 2a \\ \quad 2 \quad -2a+6 \quad -4a+2b+12 \\ \hline 1 \quad -2+3 \quad -2a+b+6 \quad -2a+2b+12 = -4 \end{array}$$

$$\begin{array}{r} -2a-2b=4 \\ -2a+2b=-16 \\ \hline -4b=20 \\ b=-5 \end{array} \quad \begin{array}{r} -2a+10=4 \\ -2a=-6 \\ a=3 \end{array}$$

$$\begin{aligned} & x^2 - (2+1)x + (2a+b+2) \\ & x^2 - 4x + 3 \\ & (x-3)(x-1) \end{aligned}$$

akar-akar persamaan

$$= (x+2)(x-3)(x-1) \Rightarrow -2, 3, 1$$

$$\begin{array}{r} [4] \quad f(-1) = -p+q = 1 \\ f(2) = 2p+q = 13 \\ \hline 3p = 12 \\ p = 4 \end{array} \quad \begin{array}{r} \Rightarrow -4+q=1 \\ q=5 \end{array}$$

$$\Rightarrow f(x) : (x+1)(x-2) \text{ bersisa } 4x+5$$

$$\begin{array}{r} [5] \quad f(-1) = -p+q = -3 \\ f(1) = p+q = 5 \\ \hline -2p = -8 \\ p = 4 \end{array} \quad \begin{array}{r} \Rightarrow q = 5-4 \\ = 1 \end{array}$$

$$\Rightarrow f(x) : (x^2-1) \text{ bersisa } 4x+1$$

$$[6] \text{ misal } f(x) = ax^2 + bx + c$$

$$\begin{array}{l} f(-2) = 4a - 2b + c = 0 \\ f(3) = 9a + 3b + c = 25 \\ f(5) = 25a + 5b + c = 49 \end{array} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 5a + 5b = 25 \\ 5a + 5b = 25 \\ 5a + 5b = 25 \end{array}$$

$$\begin{array}{r} \Rightarrow 25a + 5b + c = 49 \\ 9a + 3b + c = 25 \\ \hline 16a + 2b = 24 \\ 2a + 2b = 10 \\ \hline 14a = 14 \\ a = 1 \end{array} \quad \begin{array}{r} \Rightarrow 2a + 2b = 10 \\ 2b = 8 \\ b = 4 \\ \Rightarrow 4 - 8 + c = 0 \\ c = 4 \end{array}$$

$$\therefore f(x) = x^2 + 4x + 4$$

$$[7] \quad x^2 - x - 6 = (x-3)(x+2)$$

$$\begin{array}{r} P(-2) = 4a + b + 4b = -12 + 5 \\ 4a + b = -53 \end{array}$$

$$\begin{array}{r} P(3) = 9a + b + 9b = 23 \\ 9a + b = -73 \end{array}$$

$$\begin{array}{r} \Rightarrow 9a + b = -73 \\ 4a + b = -53 \\ \hline 5a = -20 \\ a = -4 \end{array} \quad \begin{array}{r} \Rightarrow -16 + b = -53 \\ b = -37 \end{array}$$

$$[8] \quad (x^2 + 5x + 6) = (x+3)(x+2)$$

$$P(-2) = ab + 4a + 6b - 32 = 0 \Rightarrow b = \frac{-4a + 32}{a+b}$$

$$P(-3) = ab + 3a + 9b - 43 = 0 \Rightarrow b = \frac{43 - 3a}{a+9}$$

$$\frac{-4a + 32}{a+b} = \frac{43 - 3a}{a+9}$$

$$-4a^2 - 4a + 288 = -3a^2 + 25a + 258$$

$$-a^2 - 29a + 30 = 0$$

$$(-a+1)(a+30) = 0$$

$$a = 1 \rightarrow b = 4$$

$$a = -30 \rightarrow b = \frac{-152}{24}$$

$$\boxed{9} \quad P(x) = x^3 + (3a-b)x^2 - (4a-2)x + 3b$$

$$x^2 - 7x + 6 = (x-6)(x-1)$$

$$P(1) = 1 + 3a - b - 4a + 2 + 3b = 3$$

$$2b - a = 0$$

$$P(6) = 11b - 28a = -225$$

$$\Rightarrow 11b - 28a = -225$$

$$\Rightarrow 10 - a = 0$$

$$\boxed{a = 10}$$

$$56b - 28a = 0$$

$$45b = 225$$

$$\boxed{b = 5}$$

$$\boxed{10} \quad P(x) = x^4 - ax^3 - (3a+2b)x^2 + (a+b)x - (5b-4a)$$

$$x^2 + x - 6 = (x+3)(x-2)$$

$$P(-3) = a - 26b + 81 = 1$$

$$a - 26b = -80$$

$$P(2) = -14a - 11b + 16 = 11$$

$$-14a - 11b = -5$$

$$\Rightarrow -14a - 11b = -5$$

$$14a - 364b = -1120$$

$$-405b = -1125$$

$$b = 25$$

$$\Rightarrow a - 26(25) = -80$$

$$a - 650 = -80$$

$$a = 570$$

Uji Pemahaman 7 (hal 25)

[1] $10x^3 - 9x^2 - 34x - 15 = (2x-5)(5x+3)(x+1)$

Jawaban : C

[2] $x^2 - 2x + 1 = (x-1)^2$

$$\begin{array}{r|rrrr} 1 & 1 & a & b & -10 & 3 \\ & & 1 & a+1 & a+b+1 & a+b+9 \\ \hline 1 & 1 & a+1 & a+b+1 & a+b-9 & a+b-6 \rightarrow a+b-6=0 \\ & & 1 & a+2 & 2a+b+3 & b=6-a \\ \hline 1 & 1 & a+2 & 2a+b+3 & 3a+2b-6 & 3a+2b-6 \rightarrow 3a+2b=6 \end{array}$$

$\Rightarrow 3a + 2(6-a) = 6 \quad \Rightarrow b = 6 - (-6) = 12$

$a + 12 = 6$
 $a = -6$

$\Rightarrow \frac{b}{a} = \frac{12}{-6} = -2$

Jawaban : A

[3] $P(x) = 3x^4 + 9x^3 - 7x^2 + Kx + 9 = 0$

$P(1) = K + 14 = 0$

$K = -14$

$\Rightarrow 3x^4 + 9x^3 - 7x^2 - 14x + 9 = P(x)$

$x_1 x_2 x_3 x_4 = \frac{9}{3} = 3$

Jawaban : E

[4] $P(x) = 2x^3 + px^2 + qx + 6$

$P(-3) = 9p - 3q = 48$

$P(2) = 2p + q = -11$

$\Rightarrow \begin{array}{r} 6p + 3q = -33 \\ 9p - 3q = 48 \\ \hline 15p = 15 \\ p = 1 \end{array} \quad \Rightarrow \begin{array}{l} q = -11 - 2 \\ = -13 \end{array}$

$2x^3 + x^2 - 13x + 6 = (2x-1)(x-2)(x+3)$

$x_1 = -3 \quad \Rightarrow x_1 + x_2 + x_3 = -3 + \frac{1}{2} + 2$

$x_2 = \frac{1}{2} \quad = -\frac{1}{2}$

$x_3 = 2$

Jawaban : C

[5] $4x^3 + 12x^2 + 5x - 6$

$= (2x-1)(2x+3)(x+2)$

$x = \frac{1}{2} \quad x = -\frac{3}{2} \quad x = -2$

$\Rightarrow x_1 < x_2 < x_3$

$x_1 = -2, x_2 = -\frac{3}{2}, x_3 = \frac{1}{2}$

$\Rightarrow \frac{5x_2 - x_3}{x_1} = \frac{5(-\frac{3}{2}) - \frac{1}{2}}{-2}$

$= \frac{-\frac{15}{2} - \frac{1}{2}}{-2}$

$= \frac{-8}{-2}$

$= 4$

Jawaban : E

B. Uraian

$$\begin{aligned} \boxed{1} \quad a. f(6) &= 6^2 - 7(6) + 6 \\ &= 36 - 42 + 6 \\ &= 0 \text{ (qed)} \end{aligned}$$

$$\begin{aligned} b. f(-3) &= (-3)^3 - 3(-3)^2 - 10(-3) + 24 \\ &= -27 - 27 + 30 + 24 \\ &= 0 \text{ (qed)} \end{aligned}$$

$$\begin{aligned} c. f(2) &= 2^3 - 6(2)^2 + 3(2) + 10 \\ &= 8 - 24 + 6 + 10 \\ &= 0 \text{ (qed)} \end{aligned}$$

$$\begin{aligned} d. f(-5) &= 4(-5)^4 + 8(-5)^3 - 15(-5)^2 + 45(-5) - 900 \\ &= 2500 - 1000 - 375 - 225 - 900 \\ &= 0 \text{ (qed)} \end{aligned}$$

$$\begin{aligned} e. f\left(-\frac{3}{2}\right) &= 6\left(-\frac{3}{2}\right)^4 + 15\left(-\frac{3}{2}\right)^3 - 52\left(-\frac{3}{2}\right)^2 - 59\left(-\frac{3}{2}\right) - 3 \\ &= \frac{243}{8} - \frac{351}{8} - \frac{576}{8} + \frac{708}{8} - \frac{24}{8} \\ &= \frac{0}{8} = 0 \text{ (qed)} \end{aligned}$$

$$\boxed{2} \quad a.) x^3 - 2x^2 - x + 2 = (x-2)(x-1)(x+1)$$

$$b.) x^3 - 2x^2 - 5x + 6 = (x-1)(x+2)(x-3)$$

$$c.) x^3 - 5x^2 - x + 5 = (x-5)(x-1)(x+1)$$

$$\boxed{3} \quad a. (x-1), (x+1), (x-3), (x+2)$$

$$b. (x+2)$$

$$c. (2x+1), (x-1)$$

$$d. (2x+1), (x-4)$$

$$e. (x-3), (x+3)$$

$$f. (5x+3), (2x-3), (x-1)$$

$$g. (2x-5), (2x-7)$$

$$h. (7x+3), (5x-7)$$

$$i. (x-1), (x-2), (x+3)$$

$$j. (t-1), (t-3), (t-4)$$

$$k. (t-2), (t-5), (t+7)$$

$$l. (x-1), (x-2), (x-3)$$

$$m. (x-3), (x-1)^2$$

$$n. (2x-1), (x+1), (x+3)$$

$$o. (m-3)$$

$$p. (3p-4), (p-1), (p+1)$$

$$\boxed{4} \quad p(x) = x^4 + 5x^3 - ax^2 + 5x + 1$$

$$\begin{aligned} a) p(-1) &= 1 - 5 - a - 5 + 1 = 0 \\ -a - 8 &= 0 \\ a &= -8 \end{aligned}$$

$$\begin{aligned} b) p(1) &= 1 + 5 - a + 5 + 1 = 0 \\ 12 - a &= 0 \\ a &= 12 \end{aligned}$$

$$\boxed{5} \quad p(x) = 2x^4 + 9x^3 + 5x^2 + 3x + p$$

$$\begin{aligned} a) p(-4) &= 512 - 576 + 80 - 12 + p = 0 \\ p &= -4 \end{aligned}$$

$$\begin{aligned} b) p(1) &= 2 + 9 + 5 + 3 + p = 0 \\ p &= -19 \end{aligned}$$

$$\boxed{6} \quad a) (-1)^{2n} - 1 = 1 - 1 = 0$$

$$\begin{aligned} b) (-a)^{2n+1} + a^{2n+1} &= -a^{2n+1} - a^{2n+1} + (a^{2n+1} - a^{2n+1}) \\ &= a^{2n}(-a + a) \\ &= a^{2n} \cdot 0 \\ &= 0 \end{aligned}$$

$$\begin{aligned} c) (-b)^{2n} - b^{2n} &= b^{2n} - b^{2n} \\ &= 0 \end{aligned}$$

$$d) b^n - b^n = 0$$

$$\boxed{7} \quad p(x) = x^7 + a^5$$

$$\begin{aligned} p(a) &= a^7 + a^5 \\ &= a^5(a^2 + 1) \end{aligned}$$

A. Pilihan Ganda

1) $x_1 + x_2 + x_3 = -\frac{2}{3}$

Jawaban: B

2) $P(x) = 6x^3 + Kx^2 + 19x - 30$

$$P(-5) = 25K - 875 = 0$$

$$25K = 875$$

$$K = 35$$

$$\Rightarrow P(x) = 6x^3 + 35x^2 + 19x - 30$$

$$x_1 + x_2 + x_3 = -\frac{35}{6}$$

Jawaban: B

3) $x^4 - 2x^3 - 13x^2 + 38x - 24 = 0$

$$x_1 + x_2 + x_3 + x_4 = -(-2)$$

$$1 + x_2 + x_3 + x_4 = 2$$

$$x_2 + x_3 + x_4 = 1$$

Jawaban: C

4) $x^3 + 9x^2 - 22x + K = 0$

$$x_1 = 5$$

$$\Rightarrow x_1 + x_2 + x_3 = -9$$

$$5 + x_2 + x_3 = -9$$

$$x_2 + x_3 = -14$$

Jawaban: A

5) $2x^3 - 9x^2 - 11x + 30 = (2x-3)(x+2)(x-5)$

$$x = \frac{3}{2} \quad x = -2 \quad x = 5$$

$$x_1 > x_2 > x_3$$

$$\Rightarrow x_1^2 + x_3^2 = 25 + 4$$

$$x_1 = 5$$

$$= 29$$

$$x_2 = \frac{3}{2}$$

$$x_3 = -2$$

Jawaban: D

B. Uraian

1) a) $x^3 - 6x^2 + 11x - 6 = 0$

$$(x-1)(x-2)(x-3) = 0$$

$$HP = \{1, 2, 3\}$$

b) $x^3 + 4x^2 + 5x + 2 = 0$

$$(x+1)^2(x+2) = 0$$

$$HP = \{-2, -1\}$$

c) $x^4 - 6x^3 + 12x^2 - 10x + 3 = 0$

$$(x-3)(x-1)^3 = 0$$

$$HP = \{1, 3\}$$

d) $x^3 - 9x^2 + 26x - 12 = 0$

$$(x-1)(x-2)(x-6) = 0$$

$$HP = \{1, 2, 6\}$$

e) $6x^3 - 23x^2 + 26x - 8 = 0$

$$(2x-1)(3x-4)(x-2) = 0$$

$$HP = \left\{\frac{1}{2}, \frac{4}{3}, 2\right\}$$

2) a) $P(x) = 5x^3 + 11x^2 - 73x - 15$

$$P(-5) = 5(-5)^3 + 11(-5)^2 - 73(-5) - 15$$

$$= 0 \text{ (qed)}$$

$$\Rightarrow 5x^3 + 11x^2 - 73x - 15 = (x+5)(x-3)(5x+1)$$

$$\text{akar lain } x = 3 \text{ dan } x = -\frac{1}{5}$$

b) $P\left(-\frac{2}{3}\right) = 6\left(-\frac{2}{3}\right)^4 + 19\left(-\frac{2}{3}\right)^3 - 2\left(-\frac{2}{3}\right)^2 - 17\left(-\frac{2}{3}\right) - 6$

$$= 0 \text{ (qed)}$$

$$\Rightarrow 6x^4 + 19x^3 - 2x^2 - 17x - 6 = (3x+2)(2x+1)(x-1)(x+3)$$

$$\text{akar lain } x = -\frac{1}{2}, x = 1 \text{ dan } x = -3$$

c) $P\left(\frac{3}{5}\right) = 10\left(\frac{3}{5}\right)^4 - 21\left(\frac{3}{5}\right)^3 - 76\left(\frac{3}{5}\right)^2 - 9\left(\frac{3}{5}\right) + 36$

$$= 0$$

$$10x^4 - 21x^3 - 76x^2 - 9x + 36 = (5x-3)(2x+3)(x+1)(x-4)$$

$$\text{akar lain } x = -1, x = -\frac{3}{2}, x = 4$$

3 a) $x^3 + 6x^2 - 7x - 60 = 0$

$$(x+5)(x+4)(x-3) = 0$$

akar-akar real = $\{-5, -4, 3\}$

b) $x^3 - 17x + 84x - 108 = 0$

$$(x-2)(x-6)(x-9) = 0$$

akar-akar real = $\{2, 6, 9\}$

c) $x^4 - 6x^3 - 9x^2 + 94x - 120 = 0$

$$(x+4)(x-2)(x-3)(x-5) = 0$$

akar-akar real = $\{-4, 2, 3, 5\}$

4 a) $x^3 + 2x^2 - 11x - 12 = 0$

$$(x+1)(x+4)(x-3) = 0$$

HP = $\{-4, -1, 3\}$

b) titik sb-x $\rightarrow y=0$

$$x^3 + 2x^2 - 11x - 12 = 0$$

$$x = -4, x = -1, x = 3$$

titik potong $(-4, 0), (-1, 0), (3, 0)$

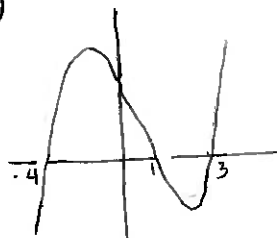
5 a) $x^3 - 13x + 12 = 0$

$$(x-1)(x-3)(x+4) = 0$$

HP = $\{-4, 1, 3\}$

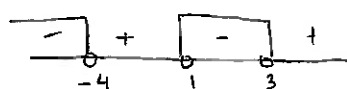
b) titik potong di $(-4, 0), (1, 0), (3, 0)$

c.)



$$x^3 - 13x + 12 < 0$$

$$(x+4)(x-1)(x-3) < 0$$



$$\{x < -4, 1 < x < 3\}$$

6 misal $y = \sin x$

a) $\rightarrow 2y^3 - 3y^2 - 8y - 3 = 0$

$$(2y+1)(y+1)(y-3) = 0$$

$$y = -\frac{1}{2} \quad y = -1 \quad y = 3$$

$$\Rightarrow \sin x = -\frac{1}{2}$$

$$\therefore \text{HP} = \{210^\circ, 270^\circ, 330^\circ\}$$

$$x = 210^\circ, 330^\circ$$

$$\Rightarrow \sin x = -1$$

$$x = 270^\circ$$

b) misal $p = \tan x$

$$6p^3 - 13p^2 + 4p + 3 = 0$$

$$(3p+1)(2p-3)(p-1) = 0$$

$$p = -\frac{1}{3} \quad p = \frac{3}{2} \quad p = 1$$

$$\Rightarrow \tan x = 1$$

$$x = 45^\circ, 225^\circ$$

$$\Rightarrow \tan x = -\frac{1}{3}$$

$$x = 161,6^\circ, 341,6^\circ$$

$$\therefore \text{HP} = \{45^\circ, 161,6^\circ, 225^\circ, 341,6^\circ\}$$

7 $(x+1)(x+3)(x-2)(x-4)$

$$= x^4 + 6x^3 + 3x^2 - 26x - 24$$

8 $x^3 - 5x^2 - 18x + 11 = 0$, $x_1 = 2x_2$

$$\Rightarrow x_1 + x_2 + x_3 = 5$$

$$3x_2 + x_3 = 5 \Rightarrow x_3 = 5 - 3x_2$$

$$\Rightarrow x_1x_2 + x_1x_3 + x_2x_3 = -18$$

$$2x_2^2 + 2x_2(5-3x_2) + x_2(5-3x_2) = -18$$

$$15x_2 - 7x_2^2 = -18$$

$$7x_2^2 - 15x_2 - 18 = 0$$

$$(7x_2+6)(x_2-3) = 0$$

$$\Rightarrow x_2 = -\frac{6}{7}$$

$$x_1 = -\frac{12}{7}$$

$$x_3 = \frac{53}{7}$$

$$\left. \begin{array}{l} x_1x_2x_3 = -11 \\ n = -\left(-\frac{6}{7}\right)\left(-\frac{12}{7}\right)\left(\frac{53}{7}\right) = -\frac{3816}{343} \end{array} \right\}$$

$$\Rightarrow x_1 x_2 x_3 = -11$$

$$x_2 = 3$$

$$x_1 = 6$$

$$x_3 = -4$$

$$\left. \begin{array}{l} x_2 = 3 \\ x_1 = 6 \\ x_3 = -4 \end{array} \right\} \begin{array}{l} 3 \cdot 6 \cdot (-4) = -11 \\ 72 = 11 \end{array}$$

$$[9] \quad x^3 - 2x^2 + 3x - 4 = 0$$

$$a.) \quad x_1 + x_2 + x_3 = 2$$

$$b.) \quad x_1 x_2 + x_1 x_3 + x_2 x_3 = 3$$

$$c.) \quad x_1 x_2 x_3 = 4$$

$$\begin{aligned} d.) \quad x_1^2 + x_2^2 + x_3^2 &= (x_1 + x_2 + x_3)^2 - 2(x_1 x_2 + x_1 x_3 + x_2 x_3) \\ &= 2^2 - 2(3) \\ &= 4 - 6 \\ &= -2 \end{aligned}$$

$$\begin{aligned} e.) \quad x_1^3 + x_2^3 + x_3^3 &= (x_1 + x_2 + x_3)^3 - 3(x_1 + x_2 + x_3)(x_1 x_2 + x_1 x_3 + x_2 x_3) + 3(x_1 x_2 x_3) \\ &= 2^3 - 3(2)(3) + 3(4) \\ &= 8 - 18 + 12 \\ &= 2 \end{aligned}$$

$$f.) \quad \frac{1}{x_1} + \frac{1}{x_2} + \frac{1}{x_3} = \frac{x_2 x_3 + x_1 x_3 + x_1 x_2}{x_1 x_2 x_3} = \frac{3}{4}$$

$$[10] \quad x^4 - 4ax^3 + (3a+b)x^2 + (4a-7b+c)x + 60 = 0$$

$$\Rightarrow x_1 + x_2 + x_3 + x_4 = 4a \quad \Rightarrow x_3 - x_4 = 1$$

$$1 + 2 + x_3 + (x_3 - 1) = 4a$$

$$2x_3 = 4a - 2$$

$$x_3 = 2a - 1$$

$$\Rightarrow x_1 x_2 x_3 x_4 = 60 \quad \Rightarrow x_3 = 6 \rightarrow x_4 = 5$$

$$1 \cdot 2 \cdot x_3 \cdot x_4 = 60$$

$$x_3 x_4 = 30$$

$$\Rightarrow x_3 = -5 \rightarrow x_4 = -6$$

$$\Rightarrow x_3(x_3 - 1) = 30$$

$$a = -2$$

$$x_3^2 - x_3 - 30 = 0$$

$$(x_3 - 6)(x_3 + 5)$$

$$\Rightarrow x_1 = 1, x_2 = 2, x_3 = 6, x_4 = 5, a = \frac{7}{2}$$

$$x_1 x_2 + x_1 x_3 + x_1 x_4 + x_2 x_3 + x_2 x_4 + x_3 x_4 = 3a + b$$

$$2 + 6 + 5 + 12 + 10 + 30 = 3\left(\frac{7}{2}\right) + b$$

$$65 - \frac{21}{2} = b$$

$$\frac{109}{2} = b$$

$$x_1 x_2 x_3 + x_1 x_2 x_4 + x_1 x_3 x_4 + x_2 x_3 x_4 = 4a - 7b + c$$

$$12 + 10 + 30 + 60 = 14 - 7\left(\frac{109}{2}\right) + c$$

$$98 + \frac{763}{2} = c$$

$$\frac{959}{2} = c$$

$$\Rightarrow x_1 = 1, x_2 = 2, x_3 = -5, x_4 = -6, a = -2$$

$$x_1 x_2 + x_1 x_3 + x_1 x_4 + x_2 x_3 + x_2 x_4 + x_3 x_4 = 3a + b$$

$$2 - 5 - 6 - 10 - 12 + 30 = -6 + b$$

$$5 = b$$

$$x_1 x_2 x_3 + x_1 x_2 x_4 + x_1 x_3 x_4 + x_2 x_3 x_4 = 4a - 7b + c$$

$$-10 + (-12) + (30) + (60) = -8 - 35 + c$$

$$111 = c$$

Uji Pemahaman 9 (hal 36)

$$\begin{aligned} \text{[1]} \quad \frac{x+2}{x^2-x-6} &= \frac{A}{x+2} + \frac{B}{x-3} \\ &= \frac{A(x-3) + B(x+2)}{x^2-x-6} \end{aligned}$$

$$\Rightarrow x+2 = (A+B)x + (-3A+2B)$$

$$\begin{aligned} \Rightarrow \begin{array}{l} A+B=1 \\ -3A+2B=2 \end{array} \quad \begin{array}{l} \times 2 \\ \times 1 \end{array} \quad \begin{array}{l} 2A+2B=2 \\ -3A+2B=2 \end{array} \\ \hline 5A=0 \\ A=0 \\ B=1 \end{aligned}$$

$$\therefore \frac{x+2}{x^2-x-6} = \frac{1}{x-3}$$

$$\text{[2]} \quad \frac{x+3}{3x^2+4x+1} = \frac{A}{3x+1} + \frac{B}{x+1}$$

$$x+3 = A(x+1) + B(3x+1)$$

$$x+3 = (A+3B)x + (A+B)$$

$$\begin{aligned} \Rightarrow \begin{array}{l} A+3B=1 \\ A+B=3 \end{array} \quad \begin{array}{l} \Rightarrow A-1=3 \\ A=4 \end{array} \\ \hline 2B=-2 \\ B=-1 \end{aligned}$$

$$\therefore \frac{x+3}{3x^2+4x+1} = \frac{4}{3x+1} - \frac{1}{x+1}$$

$$\text{[3]} \quad \frac{x+20}{(5-3x)(1+2x)} = \frac{A}{5-3x} + \frac{B}{1+2x}$$

$$x+20 = A(1+2x) + B(5-3x)$$

$$x+20 = (2A-3B)x + (A+5B)$$

$$\begin{aligned} \Rightarrow \begin{array}{l} 2A-3B=1 \\ A+5B=20 \end{array} \quad \begin{array}{l} \times 1 \\ \times 2 \end{array} \quad \begin{array}{l} 2A-3B=1 \\ 2A+10B=40 \end{array} \\ \hline -13B=-39 \\ B=3, A=5 \end{aligned}$$

$$\therefore \frac{x+20}{(5-3x)(1+2x)} = \frac{5}{5-3x} + \frac{3}{1+2x}$$

$$\begin{aligned} \text{[4]} \quad \frac{2x+3}{x(x^2-1)} &= \frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-1} \\ &= \frac{A(x^2-1) + Bx(x-1) + Cx(x+1)}{x(x^2-1)} \end{aligned}$$

$$2x+3 = (A+B+C)x^2 + (-B+C)x - A$$

$$\begin{aligned} \Rightarrow -A=3 & \quad \Rightarrow A+B+C=0 \\ A=-3 & \quad B+C=3 \end{aligned}$$

$$\begin{aligned} \Rightarrow -B+C=2 & \quad \Rightarrow C=3-\frac{1}{2} \\ B+C=3 & \quad = \frac{5}{2} \\ \hline -2B=-1 \\ B=\frac{1}{2} \end{aligned}$$

$$\therefore \frac{2x+3}{x(x^2-1)} = \frac{-3}{x} + \frac{1}{2(x+1)} + \frac{5}{2(x-1)}$$

$$\text{[5]} \quad \frac{x+2}{2x^2-7x-15} = \frac{7}{13(x-5)} - \frac{1}{13(2x+3)}$$

$$\begin{aligned} \text{[6]} \quad \frac{x+2}{x^2(1-x)} &= \frac{A+B}{x^2} + \frac{C}{1-x} \\ &= \frac{(A+B)(1-x) + Cx^2}{x^2(1-x)} \end{aligned}$$

$$\Rightarrow x+2 = (-A+C)x^2 + (A-B)x + B$$

$$\begin{aligned} \Rightarrow -A+C=0 & \quad \Rightarrow A=3 \\ A-B=1 & \quad C=3 \\ B=2 \end{aligned}$$

$$\therefore \frac{x+2}{x^2(1-x)} = \frac{3x+2}{x^2} + \frac{3}{1-x}$$

$$\text{[7]} \quad \frac{2x-1}{(x+1)^2} = \frac{2}{x+1} - \frac{3}{(x+1)^2}$$

$$\text{[8]} \quad \frac{2x^2+10x-3}{(x+1)(x-9)^2} = \frac{211}{100(x-9)} - \frac{11}{100(x+1)} + \frac{249}{10(x-9)^2}$$

$$[9] \quad \frac{5x^2 + 23x - 7}{(x-1)(x+3)^2} = \frac{A}{x-1} + \frac{B}{x+3} + \frac{C}{(x+3)^2}$$

$$\begin{aligned} 5x^2 + 23x - 7 &= A(x+3)(x+3)^2 + B(x-1)(x+3)^2 + C(x-1)(x+3) \\ &= A(x^3 + 9x^2 + 27x + 27) + B(x^3 + 5x^2 + 3x - 9) + \\ &\quad C(x^2 + 2x - 3) \end{aligned}$$

$$\begin{aligned} \Rightarrow A + B &= 0 & \Rightarrow 7A + 7B &= 0 \\ 9A + 5B + C &= 5 & -9A + 7B &= -13 \\ 27A + 3B + 2C &= 23 & \hline 16A &= 13 \\ 27A + (-9B) - 3C &= -7 & A &= \frac{13}{16} \end{aligned}$$

$$\begin{aligned} \Rightarrow 18A + 10B + 2C &= 10 & B &= -\frac{13}{16} \\ 27A + 3B + 2C &= 23 & C &= \frac{28}{16} \\ -9A + 7B &= -13 & \hline \end{aligned}$$

$$\therefore \frac{5x^2 + 23x - 7}{(x-1)(x+3)^2} = \frac{13}{16(x-1)} - \frac{13}{16(x+3)} + \frac{28}{16(x+3)^2}$$

$$[10] \quad \frac{11x^2 + 4x + 12}{(2x+1)(x^2+4)} = \frac{4x}{x^2+4} + \frac{3}{2x+1}$$

$$[11] \quad \frac{3x^2 + 5x + 1}{(x^2 - 2x - 1)(3x - 2)} = \frac{Ax + B}{x^2 - 2x - 1} + \frac{C}{3x - 2}$$

$$3x^2 + 5x + 1 = 3Ax^2 - 2Ax + 3Bx - 2B + C(x^2 - 2x - 1)$$

$$\begin{aligned} \Rightarrow \left. \begin{aligned} 3A + C &= 3 \\ -2A + 3B - 2C &= 5 \\ -2B - C &= 1 \end{aligned} \right\} \begin{aligned} A &= 2 \\ B &= 1 \\ C &= -3 \end{aligned} \end{aligned}$$

$$\therefore \frac{3x^2 + 5x + 1}{(x^2 - 2x - 1)(3x - 2)} = \frac{2x + 1}{x^2 - 2x - 1} + \frac{(-3)}{3x - 2}$$

$$[12] \quad \frac{x^3 - 1}{(x+1)(x-2)} = x + \frac{7}{3(x-2)} + \frac{2}{3(x+1)} + 1$$

Uji Pemahaman 10 (hal 41)

1) $f(x) = 3x^6 + 2x^5 - 46x^4 - 60x^3 + 67x^2 + 58x - 4$

Bahan baku produksi memenuhi $(3x-1)$

a) Hasil bagi: banyak roti yang dapat diproduksi

$$\begin{array}{r|rrrrrrr} \frac{1}{3} & 3 & 2 & -46 & -60 & 67 & 58 & -4 \\ & & 1 & 1 & -15 & -25 & 14 & 24 \\ \hline & 3 & 3 & -45 & -75 & 42 & 72 & 20 \end{array}$$

\Rightarrow banyak roti = $x^5 + x^4 - 15x^3 - 25x^2 + 14x + 24$

b) sisa = 20

2) $V = P \times l \times t$

$93.600 = 5x(2x+6)(3x+6)$

$0 = 30x^3 + 150x^2 + 180x - 93.600$

$0 = 30(x-13)(x^2 + 18x + 240)$
Imajiner

$\Rightarrow x = 13$

$P = 5x = 65$

$l = 2x + 6 = 2(13) + 6 = 32$

$t = 3x + 6 = 45$

3) $S_1 - S_2 = 2 \Rightarrow S_2 = S_1 - 2$

$V_1 + V_2 = 72$

$S_1^3 + S_2^3 = 72$

$S_1^3 + (S_1 - 2)^3 = 72$

$S_1^3 + S_1^3 - 6S_1^2 + 12S_1 - 8 - 72 = 0$

$2S_1^3 - 6S_1^2 + 12S_1 - 80 = 0$

$2(S_1 - 4)(S_1^2 + S_1 + 10) = 0$

$\Rightarrow S_1 = 4, S_2 = 2$

\Rightarrow Total biaya = $(S_1^2 + S_2^2) \times \text{Rp } 80.000$
= $(16 + 4) \times \text{Rp } 80.000$
= $\text{Rp } 1.600.000$

4) misal $P = {}^{16}\log x$

$(2P)^5 - 5(2P)^4 + 70P^3 - (5P)^2 + 3P = 0$

$32P^5 - 80P^4 + 70P^3 - 25P^2 + 3P = 0$

$P(P-1)(4P-1)(4P-3)(2P-1) = 0$

$P = 0 \quad P = 1 \quad P = \frac{1}{4} \quad P = \frac{3}{4} \quad P = \frac{1}{2}$

$\Rightarrow {}^{16}\log x = 0 \Rightarrow x = 1$

${}^{16}\log x = 1 \Rightarrow x = 16$

${}^{16}\log x = \frac{1}{4} \Rightarrow x = 2$

${}^{16}\log x = \frac{3}{4} \Rightarrow x = 8$

${}^{16}\log x = \frac{1}{2} \Rightarrow x = 4$

a) $x_1 < x_2 < x_3 < x_4 < x_5$

$1 < 2 < 4 < 8 < 16$

b) $x_1 + x_2 + x_3 + x_4 + x_5 = 31$

c) $x_1 x_2 x_3 x_4 x_5 = 1024$

5) $f(x) = x^3 - x^2 + 5x - 2$

a) $f(12) = 1642$

Penjualan dalam 1 minggu = $f(12) \times 7$
= 1642×7
= 11.494

b) Hasil penjualan per hari = $1642 \times \text{Rp } 4.200$
= $\text{Rp } 6.896.400$

c) Keuntungan perhari = $1642(4200 - (2500))$
= $\text{Rp } 2.791.400$

Paket kecil

$$\left. \begin{array}{l} p_k = x \\ l_k = x - 5 \\ t_k = x - 15 \end{array} \right\} V_k = 35.000 \text{ cm}^3$$

$$\Rightarrow V_k = p_k \times l_k \times t_k$$

$$35.000 = x(x-5)(x-15)$$

$$0 = x^3 - 20x^2 + 75x - 35.000$$

$$0 = (x-40)(x^2 + 20x + 875)$$

$$\downarrow \quad \quad \quad \text{Imajiner}$$

$$x = 40$$

$$\therefore p_k = 40 \quad \text{Lalas} = 40 \times 35 = 1400 \text{ cm}^2$$

$$l_k = 35$$

$$t_k = 25$$

$$\begin{aligned} L \text{ sisi tegak} &= 2 p_t + 2 l_t \\ &= 2(40)(25) + 2(35)(25) \\ &= 3750 \text{ cm}^2 \end{aligned}$$

Paket besar

$$\left. \begin{array}{l} p_b = x \\ l_b = x - 5 \\ t_b = x - 30 \end{array} \right\} V_b = 45.000 \text{ cm}^3$$

$$\Rightarrow V_b = p_b \times l_b \times t_b$$

$$45.000 = x(x-5)(x-30)$$

$$0 = x^3 - 35x^2 + 150x - 45.000$$

$$0 = (x-50)(x^2 + 15x + 900)$$

$$\downarrow \quad \quad \quad \text{Imajiner}$$

$$x = 50$$

$$\therefore p_b = 50 \quad \text{Lalas} = 50 \times 45 = 2250 \text{ cm}^2$$

$$l_b = 45$$

$$t_b = 20$$

$$\begin{aligned} L \text{ sisi tegak} &= 2 p_t + 2 l_t \\ &= 3.800 \text{ cm}^2 \end{aligned}$$

$$\boxed{1} \quad p_k = 40 \text{ cm} \quad (D)$$

$$l_k = 35 \text{ cm} \quad (C)$$

$$t_k = 25 \text{ cm} \quad (B)$$

$$p_b = 50 \text{ cm} \quad (F)$$

$$t_b = 20 \text{ cm} \quad (A)$$

$$\boxed{2} \quad a.) \text{ Benar}$$

$$b.) \text{ Benar}$$

$$c.) \text{ Benar}$$

$$d.) \text{ Benar}$$

$$e.) \text{ Benar}$$

$$\begin{aligned} \boxed{3} \quad 4p + 4l + 4t &= 4(p_b + l_b + t_b) \\ &= 4(50 + 45 + 20) \\ &= 4(115) \\ &= 460 \text{ cm} \end{aligned}$$

Jawaban : D

Latihan Akhir Bab 1

1] $P(x) = x^3 + 2x^2 + ax + b$

dibagi $x^2 - 3x + 2$

Sisa $3x + 2$

$$\Rightarrow x^2 - 3x + 2 = (x-2)(x-1)$$

$$\hookrightarrow P(1) = 1^3 + 2(1)^2 + a(1) + b = 3(1) + 2$$

$$1 + 2 + a + b = 3 + 2$$

$$a + b = 2$$

Jawaban : A

2] Suku banyak $x^3 + x^2 + kx + h$

dibagi $x^2 - 2x - 3$

Sisa $-37x + 89$

$$\Rightarrow x^2 - 2x - 3 = (x-3)(x+1)$$

$$\hookrightarrow P(-1) = (-1)^3 + (-1)^2 + k(-1) + h = -37(-1) + 89$$

$$= -1 + 1 - k + h = 37 + 89$$

$$-k + h = 126 \dots (1)$$

$$\hookrightarrow P(3) = 3^3 + 3^2 + k(3) + h = -37(3) + 89$$

$$27 + 9 + 3k + h = -111 + 89$$

$$3k + h = -58 \dots (2)$$

\Rightarrow Eliminasi (1) & (2)

$$-k + h = 126$$

$$3k + h = -58$$

$$\hline -4k = 184$$

$$k = -46$$

$$\Rightarrow -(-46) + h = 126$$

$$h = 80$$

$$\therefore k + h = -46 + 80 = 34$$

Jawaban : C

3] $P(x) = x^6 - x^3 - 5$ dibagi oleh $x^2 - 1$

Sisa: ... ?

$$\Rightarrow x^2 - 1 = (x+1)(x-1)$$

$$\hookrightarrow P(1) = 1^6 - 1^3 - 5 = a(1) + b$$

$$-5 = a + b \dots (1)$$

$$\hookrightarrow P(-1) = (-1)^6 - (-1)^3 - 5 = a(-1) + b$$

$$1 + 1 - 5 = -a + b$$

$$-3 = -a + b \dots (2)$$

\Rightarrow Eliminasi (1) dan (2)

$$a + b = -5$$

$$-a + b = -3$$

$$\hline 2a = -2$$

$$a = -1$$

$$\Rightarrow -1 + b = -5$$

$$b = -4$$

$$\therefore \text{Sisa} = ax + b = -x - 4$$

Jawaban : D

4] $f(x) = 3x^3 - 5x^2 + px + q$

faktor : $(x+1)(x-3)$

$$\Rightarrow f(-1) = 3(-1)^3 - 5(-1)^2 + p(-1) + q = 0$$

$$-3 - 5 - p + q = 0$$

$$-p + q = 8 \dots (1)$$

$$\Rightarrow f(3) = 3(3)^3 - 5(3)^2 + p(3) + q = 0$$

$$81 - 45 + 3p + q = 0$$

$$3p + q = -36 \dots (2)$$

\Rightarrow Eliminasi (1) dan (2)

$$-p + q = 8$$

$$3p + q = -36$$

$$\hline -4p = 44$$

$$p = -11$$

$$\Rightarrow -(-11) + q = 8$$

$$q = -3$$

$$\therefore p = -11 \text{ dan } q = -3$$

Jawaban : A

1

5. $P(x)$ dibagi $x^2 - 4x + 3$ sisa $4x + m$

$P(x)$ dibagi $(x-1)$ sisa 2

$P(x)$ dibagi $(x-3)$ sisa ...?

$$\Rightarrow x^2 - 4x + 3 = (x-3)(x-1)$$

$$\Rightarrow P(1) = 4(1) + m = 2$$

$$m = -2$$

$$\Rightarrow P(3) = 4(3) + m$$

$$= 12 + (-2) = 10$$

$\therefore P(x)$ dibagi $(x-3)$ sisa 10

Jawaban : E

6. $P_1(x) = x^3 - 4x^2 + 5x + a$

$$P_2(x) = x^2 + 3x - 2$$

$\Rightarrow P_1(-1) = P_2(-1), a = \dots?$

$$\Rightarrow P_1(-1) = (-1)^3 - 4(-1)^2 + 5(-1) + a$$

$$= -1 - 4 - 5 + a$$

$$= -10 + a$$

$$\Rightarrow P_2(-1) = (-1)^2 + 3(-1) - 2$$

$$= 1 - 3 - 2$$

$$= -4$$

$$\Rightarrow P_1(-1) = P_2(-1)$$

$$-10 + a = -4$$

$$a = 6$$

Jawaban : D

7. $(x^2 - x) : x(x-1)$

$$\frac{F(x)}{x(x-1)} \text{ sisa } (3x+1)$$

$$F(1) = 3(1) + 1 = a + b$$

$$4 = a + b \dots (i)$$

$$x^2 + x = x(x+1)$$

$$\Rightarrow \frac{F(x)}{x(x+1)} \text{ sisa } (5x-1)$$

$$\Rightarrow F(-1) = 5(-1) - 1 = a + b$$

$$-6 = -a + b \dots (ii)$$

$$\Rightarrow F(x) : (x^2 - 1) = F(x) : (x+1)(x-1)$$

dari (i) dan (ii)

$$a + b = 4$$

$$-a + b = -6 +$$

$$2b = -2$$

$$b = -1$$

$$a = 5$$

$\therefore F(x)$ dibagi $(x^2 - 1)$ bersisa $5x - 1$

Jawaban : E

8. $(x^2 - x - 6) = (x-3)(x+2)$

$$P(x) = 2x^4 - 3x^3 + ax^2 + 5x + b$$

$$\Rightarrow P(3) = 2(3)^4 - 3(3)^3 + a(3)^2 + 5(3) + b = 6(3) + 5$$

$$= 162 - 81 + 9a + 15 + b = 18 + 5$$

$$9b + 9a + b = 23$$

$$9a + b = -73 \dots (i)$$

$$\Rightarrow P(-2) = 2(-2)^4 - 3(-2)^3 + a(-2)^2 + 5(-2) + b = 6(-2) + 5$$

$$= 32 + 24 + 4a - 10 + b = -12 + 5$$

$$4b + 4a + b = -7$$

$$4a + b = -53 \dots (ii)$$

dari (i) dan (ii)

$$9a + b = -73$$

$$4a + b = -53 -$$

$$5a = -20$$

$$a = -4$$

$$9(-4) + b = -73$$

$$b = -37$$

$$\therefore a - b = -4 + 37 = 33$$

Jawaban : E

9 $S(x) = Ax^2 + Bx + C$

$P(1) = A + B + C = -33 \dots (i)$

$P(2) = 4A + 2B + C = 79 \dots (ii)$

$P(3) = 9A + 3B + C = 337 \dots (iii)$

$\Rightarrow (ii) - (i)$ hasilnya

$3A + B = 112 \dots (iv)$

$\Rightarrow (iii) - (ii)$ hasilnya

$5A + B = 258 \dots (v)$

\Rightarrow dari (iv) dan (v)

$\Rightarrow B = -107$

$5A + B = 258$

$3A + B = 112$

$2A = 146$

$A = 73$

$C = 1$

$\therefore S(x) = 73x^2 - 107x + 1$

$S(1) = 73 + 107 + 1$

$= 181$

Jawaban : C

10. misalkan $x^3 + 8x^2 + ax + 9$ memiliki

akar α, β, γ Sedangkan $x^3 - 8x^2 + bx - 7$

memiliki akar α, β, C

$\Rightarrow \alpha + \beta + \gamma = -8$

$\alpha + \beta + C = 8$

$\gamma - C = -16 \dots (i)$

$\Rightarrow \alpha \beta \gamma = -9$
 $\alpha \beta C = 7$ } $\frac{\gamma}{C} = \frac{-9}{7} \dots (ii)$

dan (i) & (ii) maka diperoleh

$C - 16 = \frac{-9}{7} C$

$\frac{16}{7} C = 16$

$C = 7$

$\gamma = -9$

\Rightarrow Sehingga diperoleh

$\alpha + \beta = 1$

$\alpha \cdot \beta = 1$

\Rightarrow faktor berderajat dua adalah $x^2 - x + 1$

Sehingga

$\Rightarrow x^3 + 8x^2 + ax + 9 = (x^2 - x + 1)(x + 9)$
 $= x^3 + 8x^2 - 8x + 9$

$\therefore a = -8$

$\Rightarrow x^3 - 8x^2 + bx - 7 = (x^2 - x + 1)(x - 7)$
 $= x^3 - 8x^2 + 8x - 7$

$\therefore b = 8$

$\Rightarrow b - a = 8 - (-8) = 16$

Jawaban : B

11 $P(x) = x^4 + 3x^3 + 6x^2 - 13$

$\Rightarrow P(3) = 3^4 + 3 \cdot 3^3 + 6 \cdot 3^2 - 13$

$= 81 + 81 + 54 - 13$

$= 203$

Jawaban : C

12 $P(x) = x^4 - 3x^3 - 5x^2 + x - 6$

$\Rightarrow (x^2 - x - 2) = (x - 2)(x + 1)$

$P(2) = 2^4 - 3 \cdot 2^3 - 5 \cdot 2^2 + 2 - 6 = a(x) + b$

$16 - 24 - 20 + 2 - 6 = a(2) + b$

$-32 = 2a + b \dots (i)$

$P(-1) = (-1)^4 - 3(-1)^3 - 5(-1)^2 + (-1) - 6 = a(-1) + b$

$1 + 3 - 5 - 1 - 6 = -a + b$

$-8 = -a + b \dots (ii)$

dan (i) dan (ii)

$2a + b = -32$

$-a + b = -8$

$3a = -24$

$a = -8$

$b = -16$

$\therefore ax + b = -8x - 16$

Jawaban : A

3

$$13) P(x) = x^4 - 2x^3 + ax^2 + 2x + b$$

$$\Rightarrow (x^2 - 3x - 4) = (x - 4)(x + 1)$$

$$\Rightarrow P(4) = 4^4 - 2 \cdot 4^3 + a \cdot 4^2 + 2 \cdot 4 + b = 0$$

$$256 - 128 + 16a + 8 + b = 0$$

$$16a + b = -136 \dots (i)$$

$$\Rightarrow P(-1) = (-1)^4 - 2(-1)^3 + a(-1)^2 + 2(-1) + b = 0$$

$$1 + 2 + a - 2 + b = 0$$

$$a + b = -1 \dots (ii)$$

dari (i) dan (ii)

$$16a + b = -136$$

$$\Rightarrow -9 + b = -1$$

$$a + b = -1$$

$$b = 8$$

$$15a = -135$$

$$a = -9$$

$$\Rightarrow a^2 + b^2 + 2ab = (-9)^2 + 8^2 + 2(-9)(8)$$

$$= 81 + 64 + (-144)$$

$$= 1$$

Jawaban : A

$$14) P(x) = x^4 - 2x^3 - 3x^2 - 4x - 8$$

dibagi $(x + 2)$

$$\begin{array}{r|rrrrr} -2 & 1 & -2 & -3 & -4 & -8 \\ & & -2 & 8 & -10 & 28 \\ \hline & 1 & -4 & 5 & -14 & 20 \end{array}$$

\therefore hasil bagi adalah

$$x^3 - 4x^2 + 5x - 14 \text{ dan sisa } 20$$

Jawaban : B

$$15) P(x) = 3x^4 - 5x^3 - 14x^2 + 5x + 16$$

dibagi $(3x + 1)$

$$\begin{array}{r|rrrrrr} -\frac{1}{3} & 3 & -5 & -14 & 5 & 16 \\ & & -1 & 2 & 4 & -3 \\ \hline & 3 & -6 & -12 & 9 & 13 \end{array}$$

$$\Rightarrow \text{hasil bagi } 3x^3 - 6x^2 - 12x + 9$$

$$= x^3 - 2x^2 - 4x + 3$$

Sisanya adalah 13

Jawaban : C

$$16) P(1) = a(1) + b = 4$$

$$a + b = 4$$

$$P(2) = 2a + b = 7$$

$$\Rightarrow a = 3$$

$$b = 1$$

$$P(x) = ax + b = 3x + 1$$

Jawaban : C

$$17) x^3 - 7x + 6 = 0$$

$$\Rightarrow x_1 + x_2 + x_3 = 0$$

$$x_1x_2 + x_2x_3 + x_1x_3 = -7$$

$$x_1x_2x_3 = -6$$

$$\Rightarrow x_1^3 + x_2^3 + x_3^3 = (x_1 + x_2 + x_3)^3 - 3(x_1 + x_2 + x_3)(x_1x_2 + x_2x_3 + x_1x_3) + 3(x_1x_2x_3)$$

$$= 0^3 - 3(0)(-7) + 3(-6)$$

$$= -18$$

Jawaban : A

$$[18] x^3 + 4x^2 - 3x - 54 = 0$$

$$x_1 + x_2 + x_3 = -4$$

$$x_1 x_2 + x_1 x_3 + x_2 x_3 = -3$$

$$x_1 x_2 x_3 = 54$$

$$\begin{aligned} \Rightarrow (x_1^2 + x_2^2 + x_3^2) &= (x_1 + x_2 + x_3)^2 - 2(x_1 x_2 + x_1 x_3 + x_2 x_3) \\ &= (-4)^2 - 2(-3) \\ &= 16 + 6 \\ &= 22 \end{aligned}$$

Jawaban: D

$$[19] x^3 - 4x^2 + x + 6 = 0 \quad p(x)$$

$$x_1 + x_2 + x_3 = 4$$

$$x_1 x_2 + x_1 x_3 + x_2 x_3 = 1$$

$$x_1 x_2 x_3 = -6$$

$\Rightarrow p(y)$ akarnya 2x akar $p(x)$

$$y_1 + y_2 + y_3 = 8 \quad \left(-\frac{b}{a}\right)$$

$$y_1 y_2 + y_1 y_3 + y_2 y_3 = 2 \quad \left(\frac{c}{a}\right)$$

$$y_1 y_2 y_3 = -12 \quad \left(-\frac{d}{a}\right)$$

$$\rightarrow a=1, b=-8, c=2, d=12$$

$$\therefore \text{Persamaannya } y^3 - 8y^2 + 2y + 12$$

Jawaban: A

$$[20] x^3 - 19x - 30 = 0$$

$$x_1 + x_2 + x_3 = 0$$

$$x_1 x_2 + x_1 x_3 + x_2 x_3 = -19$$

$$x_1 x_2 x_3 = 30$$

$\Rightarrow p(y)$ akarnya 3x akar $p(x)$

$$y_1 + y_2 + y_3 = 0$$

$$\therefore a=1$$

$$y_1 y_2 + y_1 y_3 + y_2 y_3 = -57$$

$$b=0$$

$$c=-57$$

$$y_1 y_2 y_3 = 30$$

$$d=-30$$

$$\Rightarrow p(y) = y^3 - 57y - 30$$

Jawaban: A

$$[21] x^3 - 4x + 6x - 8 = 0, \text{ akarnya } a, b, c$$

$$\begin{aligned} ab + bc + ca &= \frac{c}{a} \\ &= 6 \end{aligned}$$

Jawaban: E

$$\begin{aligned} [22] a^3 + b^3 + c^3 &= (a+b+c)^3 - 3(a+b+c)(ab+bc+ac) + 3(abc) \\ &= (4)^3 - 3(4)(6) + 3(8) \\ &= 64 - 72 + 24 \\ &= 16 \end{aligned}$$

Jawaban: D

$$\begin{aligned} [23] \frac{1}{a} + \frac{1}{b} + \frac{1}{c} &= \frac{bc + ac + ab}{abc} \\ &= \frac{6}{8} = \frac{3}{4} \end{aligned}$$

Jawaban: A

$$[24] x^3 + px^2 + (2p-1)x + (p+8) = 0$$

$$\begin{aligned} x=-2 &\rightarrow (-2)^3 + p(-2)^2 + (2p-1)(-2) + (p+8) = 0 \\ -8 + 4p - 4p + 2 + p + 8 &= 0 \\ p &= -2 \end{aligned}$$

$$\Rightarrow x_1 x_2 x_3 = -\frac{d}{a} = -\frac{(p+8)}{1} = -(-2+8) = -6$$

Jawaban: E

$$[25] x^3 - px^2 + kx + 6p = 0$$

$$x=1 \rightarrow 1^3 - p(1)^2 + k \cdot 1 + 6p = 0$$

$$1 - p + k + 6p = 0$$

$$k + 5p = -1 \quad \dots (i)$$

$$x=4 \rightarrow 4^3 - p(4)^2 + k(4) + 6p = 0$$

$$64 - 16p + 4k + 6p = 0$$

$$4k - 10p = -64 \quad \dots (ii)$$

\Rightarrow dari (i) dan (ii)

$$\begin{array}{r|l} k + 5p = -1 & \times 4 \\ 4k - 10p = -64 & \times 1 \end{array}$$

$$\Rightarrow 4k + 20p = -4 \quad \Rightarrow k = -1 - 10$$

$$4k - 10p = -64 \quad = -11$$

$$30p = 60$$

$$p = 2$$

$$\Rightarrow x_1 \cdot x_2 \cdot x_3 = -\frac{d}{a} = -\frac{6p}{1} = -6(2) = -12$$

Jawaban : A

26 $x^3 + 3x^2 - 16x + k = 0$; x_1, x_2, x_3 bil. bulat

misal $x_2 = 2x_1$

$$\Rightarrow x_1 + x_2 + x_3 = -\frac{b}{a}$$

$$x_1 + 2x_1 + x_3 = -3$$

$$3x_1 + x_3 = -3$$

$$x_3 = -3 - 3x_1$$

$$\Rightarrow x_1 x_2 + x_1 x_3 + x_2 x_3 = \frac{c}{a}$$

$$x_1 \cdot 2x_1 + x_1 x_3 + 2x_1 x_3 = -16$$

$$2x_1^2 + 3x_1 x_3 = -16$$

$$\Rightarrow 2(x_1^2) + 3x_1(-3 - 3x_1) = -16$$

$$2x_1^2 - 9x_1 - 9x_1^2 = -16$$

$$-7x_1^2 - 9x_1 + 16 = 0$$

$$7x_1^2 + 9x_1 - 16 = 0$$

$$(7x_1 + 16)(x_1 - 1) = 0$$

$$\Rightarrow x_1 = 1$$

$$x_2 = 2x_1 = 2$$

$$x_3 = -3 - 3x_1 = -3 - 3 = -6$$

$$\therefore x_1 \cdot x_2 \cdot x_3 = 1(2)(-6)$$

$$= -12$$

Jawaban : A

27 $ax^3 - bx^2 + 2ax - 3b = 0$

$$\Rightarrow x_1 + x_2 + x_3 = -\frac{b}{a}$$

$$3 = -\frac{6}{a}$$

$$3a = 6$$

$$a = 2$$

$$\Rightarrow x_1 x_2 x_3 = -\frac{d}{a}$$

$$\Rightarrow a^2 - b^2 = 4 - 16$$

$$= -12$$

$$6 = \frac{3b}{a}$$

$$6a = 3b$$

$$12 = 3b$$

$$4 = b$$

Jawaban : C

28 $x^4 - x^3 - 11x^2 + 27x - 36$

$$\begin{array}{r|rrrrrr} 3 & 1 & -1 & -11 & 27 & -36 \\ & & 3 & 6 & -15 & 36 \\ \hline -4 & 1 & 2 & -5 & 12 & 0 \\ & & -4 & 8 & -12 & \\ \hline & 1 & -2 & 3 & 0 & \end{array}$$

$$f(x) = (x-3)(x+4)(x^2 - 2x + 3)$$

$$D = b^2 - 4ac$$

$$= -8$$

(Imajiner)

\therefore Banyak akar rasional yaitu 2

Jawaban : C

29 $5x^5 - 4x^4 - 20x^3 + 8x^2 - 20x$

$$x(5x^4 - 4x^3 - 20x^2 + 8x - 20)$$

akar-akar Imajiner

\therefore Banyak akar arasional yaitu 1

Jawaban : A

$$[30] f(x) = 3x^3 - 17x^2 + hx + k = 0$$

$$x=2 \rightarrow f(2) = 3 \cdot 2^3 - 17 \cdot 2^2 + h \cdot 2 + k = 0$$

$$3 \cdot 8 - 17 \cdot 4 + 2h + k = 0$$

$$2h + k = 44 \dots (i)$$

$$x=4 \rightarrow f(4) = 3 \cdot 64 - 17 \cdot 16 + 4h + k = 0$$

$$4h + k = 80 \dots (ii)$$

dan (i) dan (ii)

$$2h + k = 44$$

$$\rightarrow 2(18) + k = 44$$

$$4h + k = 80$$

$$k = 8$$

$$-2h = -36$$

$$h = 18$$

$$\therefore f(x) = 3x^3 - 17x^2 + 18x + 8 = 0$$

Jawaban : C

$$[31] \frac{5x-1}{x(x^2-1)} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-1}$$

$$= \frac{A(x^2-1) + Bx(x-1) + Cx(x+1)}{x(x^2-1)}$$

$$= \frac{Ax^2 - A + Bx^2 - Bx + Cx^2 + Cx}{x(x^2-1)}$$

$$= \frac{(A+B+C)x^2 + (-B+C)x - A}{x(x^2-1)}$$

$$\rightarrow -A = -1$$

$$A = 1$$

$$\rightarrow A+B+C = 0$$

$$B+C = -1$$

$$\rightarrow -B+C = 5$$

$$B+C = -1$$

$$2C = 4$$

$$C = 2$$

$$\rightarrow -B+2 = 5$$

$$B = -3$$

$$\therefore A-B+C = 1 - (-3) + 2 = 6$$

Jawaban : C

$$[32] \frac{2x-1}{(x-1)(x-2)^2} = \frac{A}{x-1} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$$

$$= \frac{A(x-2)^2 + B(x-2)(x-1) + C(x-1)}{(x-1)(x-2)^2}$$

$$= \frac{A(x^2-4x+4) + B(x^2-3x+2) + Cx-C}{(x-1)(x-2)^2}$$

$$= \frac{(A+B)x^2 + (-4A-3B+C)x + (4A+2B-C)}{(x-1)(x-2)^2}$$

$$\rightarrow A+B = 0$$

$$A = -B$$

$$\rightarrow A = -(-1) = 1$$

$$\rightarrow 4(1) + 2(-1) - C = -1$$

$$\rightarrow -4A - 3B + C = 2$$

$$4 - 2 - C = -1$$

$$\rightarrow 4A + 2B - C = -1$$

$$C = 3$$

$$-B = 1$$

$$B = -1$$

$$\rightarrow A+B+C = 1 - 1 + 3 = 3$$

Jawaban : C

$$[33] \frac{5x^2-3x+2}{x(x^2-1)} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-1}$$

$$= \frac{A(x^2-1) + Bx(x-1) + Cx(x+1)}{x(x^2-1)}$$

$$= \frac{(A+B+C)x^2 + (-B+C)x - A}{x(x^2-1)}$$

$$\rightarrow -A = 2$$

$$A = -2$$

$$\rightarrow A+B+C = 5$$

$$B+C = 7$$

$$\rightarrow -B+C = -3$$

$$B+C = 7$$

$$-2B = -10$$

$$B = 5$$

$$\rightarrow 5+C = 7$$

$$C = 2$$

$$\therefore A+B+C = 5$$

Jawaban : D

(7)

$$\begin{aligned} \boxed{34} \quad \frac{5x+3}{(x+3)(1-2x)} &= \frac{A}{(x+3)} + \frac{B}{1-2x} \\ &= \frac{A(1-2x) + B(x+3)}{(x+3)(1-2x)} \\ &= \frac{(B-2A)x + (A+3B)}{(x+3)(1-2x)} \end{aligned}$$

$$\begin{aligned} \Rightarrow \begin{array}{l} B-2A=5 \\ 3B+A=3 \end{array} \quad \begin{array}{l} \times 1 \\ \times 2 \end{array} \quad \begin{array}{l} B-2A=5 \\ 6B+2A=6 \end{array} \quad + \end{aligned}$$

$$\begin{aligned} \Rightarrow 2A &= B-5 \\ &= \frac{11}{7} - 5 \\ &= -\frac{24}{7} \end{aligned}$$

$$A = -\frac{12}{7}$$

$$\begin{aligned} 7B &= 11 \\ B &= \frac{11}{7} \end{aligned}$$

$$\Rightarrow A+B = -\frac{12}{7} + \frac{11}{7} = -\frac{1}{7}$$

Jawaban: A

$$\boxed{35} \quad \frac{3x-1}{3x^2+4x+1} = \frac{A}{x+1} + \frac{B}{3x+1}$$

$$\begin{aligned} \frac{3x-1}{(x+1)(3x+1)} &= \frac{A(3x+1) + B(x+1)}{(x+1)(3x+1)} \\ &= \frac{(3A+B)x + (A+B)}{(x+1)(3x+1)} \end{aligned}$$

$$\begin{aligned} \Rightarrow 3A+B &= 3 \\ A+B &= -1 \quad - \\ \hline 2A &= 4 \\ A &= 2 \end{aligned}$$

$$\begin{aligned} \Rightarrow A+B &= -1 \\ 2+ B &= -1 \\ B &= -3 \end{aligned}$$

$$\therefore A^2+B^2 = 2^2+(-3)^2 = 4+9 = 13$$

Jawaban: D

B. Uraian

$$\boxed{1} \quad ax^5 - 3x^4 + 4x^3 + 5x^2 + bx - 6$$

$$P(2) = 32a - 3(16) + 4(8) + 5(4) + b(2) - 6 = 44$$

$$32a + 2b - 2 = 44$$

$$32a + 2b = 46 \quad \dots (i)$$

$$P(3) = 243a - 3(81) + 4(27) + 5(9) + b(3) - 6 = 168$$

$$243a + 3b - 96 = 168$$

$$243a + 3b = 264 \quad \dots (ii)$$

dari (i) dan (ii)

$$81a + b = 88$$

$$\Rightarrow 16 + b = 23$$

$$16a + b = 23 \quad -$$

$$b = 7$$

$$65a = 65$$

$$a = 1$$

$$\Rightarrow x^5 - 3x^4 + 4x^3 + 5x^2 + 7x - 6$$

$$\Rightarrow P(1) = 1 - 3 + 4 + 5 + 7 - 6 = m + n + p$$

$$8 = m + n + p \quad \dots (i)$$

$$\Rightarrow P(2) = 44 = m(2)^2 + n(2) + p$$

$$44 = 4m + 2n + p \quad \dots (ii)$$

$$\Rightarrow P(3) = 168 = 9m + 3n + p \quad \dots (iii)$$

dan dari (i) dan (ii)

$$4m + 2n + p = 44$$

$$m + n + p = 8 \quad -$$

$$3m + n = 36$$

dan dari (ii) dan (iii)

$$9m + 3n + p = 168$$

$$4m + 2n + p = 44 \quad -$$

$$5m + n = 124$$

$$\Rightarrow 5m + n = 124$$

$$3m + n = 36 \quad -$$

$$2m = 88$$

$$m = 44$$

$$\Rightarrow n = 36 - 3(44)$$

$$= -96$$

$$\Rightarrow p = 8 - 44 + 96$$

$$= 60$$

$$\therefore Ska = mx^2 + nx + p$$

$$= 44x^2 - 96x + 60$$

$$\boxed{2} \quad 4x^3 - 4ax^2 + (5a+4b)x - (a+5b) = 0$$

$$x_1 + x_2 = x_3$$

$$x_1 x_2 = 1$$

$$\Rightarrow x_1 + x_2 + x_3 = -\frac{b}{a}$$

$$x_3 + x_3 = -\frac{(-4a)}{4}$$

$$2x_3 = a$$

$$x_3 = \frac{a}{2}$$

$$\Rightarrow x_1 x_2 x_3 = -\frac{d}{a}$$

$$1. \quad x_3 = \frac{-(-(a+5b))}{4}$$

$$\frac{a}{2} = \frac{a+5b}{4}$$

$$2a = a+5b$$

$$a-5b=0 \Rightarrow a=5b$$

$$\Rightarrow x_1 x_2 + x_1 x_3 + x_2 x_3 = \frac{c}{a}$$

$$1 + x_3(x_1 + x_2) = \frac{5a+4b}{4}$$

$$1 + \frac{a^2}{4} = \frac{5a+4b}{4}$$

$$4 + a^2 = 5a + 4b$$

$$a^2 - 5a - 4b + 4 = 0$$

$$\Rightarrow (5b)^2 - 5(5b) - 4b + 4 = 0$$

$$25b^2 - 25b - 4b + 4 = 0$$

$$25b^2 - 29b + 4 = 0$$

$$(25b-4)(b-1) = 0$$

$$b = \frac{4}{25} \quad b=1$$

$$\Rightarrow b=1 \rightarrow a = 5(1) = 5$$

$$\Rightarrow b = \frac{4}{25} \rightarrow a = 5\left(\frac{4}{25}\right) = \frac{4}{5}$$

$$\boxed{3} \quad a) \quad x^4 - px^2 + qx - 8 \text{ habis dibagi } (x-1)^2$$

$$\begin{array}{r|rrrrrr} 1 & 1 & 0 & -p & q & -8 \\ & & 1 & 1 & 1-p & 1-p+q \\ \hline 1 & 1 & 1 & 1-p & 1-p+q & -p+q-7 \\ & & 1 & 2 & 3-p & \\ \hline & 1 & 2 & 3-p & 4+q-2p & \end{array}$$

$$\Rightarrow -p+q-7=0$$

$$-p+q=7$$

$$-2p+q=-4$$

$$p=11$$

$$q=18$$

$$\Rightarrow 4+q-2p=0$$

$$-2p+q=-4$$

$$b) \quad x^4 - px^3 + qx^2 - 14x^2 + 28x - 15$$

$$\begin{array}{r|rrrrrr} 1 & 1 & -p & (q-14) & 28 & -15 \\ & & 1 & 1-p & -p+q-13 & -p+q+15 \\ \hline 1 & 1 & 1-p & -p+q-13 & -p+q+15 & -p+q \\ & & 1 & 2-p & -2p+q-11 & \\ \hline & 1 & 2-p & -2p+q-11 & -3p+2q+4 & \end{array}$$

$$\Rightarrow -p+q=0$$

$$p=q$$

$$\Rightarrow -3p+2q+4=0$$

$$\Rightarrow p=q=4$$

$$-3q+2q=-4$$

$$-q=-4$$

$$q=4$$

$$\boxed{4} \quad x^4 + (2a+4)x^3 + (b-2)x^2 + \frac{1}{2}b^2x + 3a = 0$$

$$\Rightarrow x_1 + x_2 + x_3 + x_4 = -(2a+4)$$

$$x_1 x_2 + x_1 x_3 + x_1 x_4 + x_2 x_3 + x_2 x_4 + x_3 x_4 = b-2$$

$$x_1 x_2 x_3 + x_1 x_2 x_4 + x_1 x_3 x_4 + x_2 x_3 x_4 = -\frac{1}{2}b^2$$

$$x_1 x_2 x_3 x_4 = 3a$$

$$\begin{aligned} \Rightarrow x_1 &= -x_2 & \Rightarrow x_3 &= \frac{1}{x_4} \\ x_1 + x_2 &= 0 & x_3 \cdot x_4 &= 1 \end{aligned}$$

$$\begin{aligned} \Rightarrow x_1 + x_2 + x_3 + x_4 &= -2a - 4 \\ x_3 + x_4 &= -2a - 4 \dots (i) \end{aligned}$$

$$\begin{aligned} \Rightarrow x_1 x_2 x_3 x_4 &= 3a \\ x_1 x_2 &= 3a \dots (ii) \end{aligned}$$

$$\begin{aligned} \Rightarrow x_1 x_2 + x_1 x_3 + x_1 x_4 + x_2 x_3 + x_2 x_4 + x_3 x_4 &= b - 2 \\ x_1 x_2 + x_1 x_3 + x_1 x_4 - x_1 x_3 - x_1 x_4 + 1 &= b - 2 \\ x_1 x_2 &= b - 3 \dots (iii) \end{aligned}$$

dan (ii) dan (iii)

$$\begin{aligned} 3a &= b - 3 \\ 3a + 3 &= b \dots (iv) \end{aligned}$$

$$\begin{aligned} \Rightarrow x_1 x_2 x_3 + x_1 x_2 x_4 + x_1 x_3 x_4 + x_2 x_3 x_4 &= -\frac{b^2}{2} \\ x_1 x_2 (x_3 + x_4) + x_1 x_3 x_4 - x_1 x_3 x_4 &= -\frac{b^2}{2} \\ x_1 x_2 (x_3 + x_4) &= -\frac{b^2}{2} \dots (v) \end{aligned}$$

Substitusi (i), (ii), dan (iv)

$$\begin{aligned} (3a)(-2a-4) &= -\frac{(3a+3)^2}{2} \\ -6a^2 - 12a &= -\frac{(9a^2 + 18a + 9)}{2} \end{aligned}$$

$$-12a^2 - 24a = -9a^2 - 18a - 9$$

$$3a^2 + 6a - 9 = 0$$

$$a^2 + 2a - 3 = 0$$

$$(a+3)(a-1) = 0$$

$$\therefore a = -3 \text{ atau } a = 1$$

$$\Rightarrow a = -3 \rightarrow b = 3(-3) + 3 = -6$$

$$a = 1 \rightarrow b = 3(1) + 3 = 6$$

$$[5] P(x) = 19(x^{21} - x^8 + 2) - 15(x^{17} - 4x^3 + 3)$$

Tentukan sisa jika dibagi

$$a) x-1$$

$$\begin{aligned} P(1) &= 19(1^{21} - 1^8 + 2) - 15(1^{17} - 4 \cdot 1^3 + 3) \\ &= 19(2) - 15(0) \\ &= 38 \end{aligned}$$

\therefore Sisa nya adalah 38

$$b) x+1$$

$$\begin{aligned} P(-1) &= 19((-1)^{21} - (-1)^8 + 2) - 15((-1)^{17} - 4(-1)^3 + 3) \\ &= 19(-1 - 1 + 2) - 15(-1 + 4 + 3) \\ &= 19(0) - 15(6) \\ &= -90 \end{aligned}$$

\therefore Sisanya adalah -90

$$c) P(1) = ax + b = 38$$

$$a + b = 38$$

$$\begin{aligned} P(-1) &= -a + b = -90 \\ \hline 2a &= 128 \\ a &= 64 \end{aligned}$$

$$\begin{aligned} \Rightarrow 64 + b &= 38 \\ b &= -26 \end{aligned}$$

\therefore Sisanya adalah $64x - 26$

$$[6] x^2 + px + q = 0$$

$$a + b = -p$$

$$ab = q$$

$$\begin{aligned} x^2 + px + q &= (x - 2a - 3b - 1)(x + a + 3) \\ &= x^2 + ax + 3x - 2ax - 2a^2 - 6a - 3bx - 3ab - 9b \\ &\quad - x - a - 3 \\ &= x^2 + (2 - a - 3b)x + (-2a^2 - 7a - 3ab - 9b - 3) \end{aligned}$$

$$\Rightarrow x^2 + px + q = x^2 + (2-a-3b)x + (-2a^2-7a-3ab-9b-3)$$

$$\Rightarrow p = 2-a-3b$$

$$-(a+b) = 2-a-3b$$

$$-a-b = 2-a-3b$$

$$2b = 2$$

$$\boxed{b=1}$$

$$\Rightarrow q = -2a^2-7a-3ab-9b-3$$

$$ab = -2a^2-7a-3ab-9b-3$$

$$a = -2a^2-7a-3a-9-3$$

$$2a^2+11a+12=0$$

$$(2a+3)(a+4)=0$$

$$a = -\frac{3}{2} \text{ atau } a = -4$$

$$\rightarrow p = -(a+b) = -(-4+1) = 3$$

$$q = ab = -4 \cdot 1 = -4$$

$$\text{atau } p = -(-\frac{3}{2}+1) = -(-\frac{1}{2}) = \frac{1}{2}$$

$$q = -\frac{3}{2} \cdot 1 = -\frac{3}{2}$$

$$\boxed{7} \quad f_1(x) = 2x^2 - 12x + 23$$

$$\text{titik min} = -\frac{b}{2a} = \frac{12}{4} = 3$$

$$f(3) = 2 \cdot 9 - 12 \cdot 3 + 23 = 5$$

$$x=5 \text{ merupakan akar dari } x^3-15x^2+ax-105$$

$$P(5) = 5^3 - 15 \cdot 5^2 + a \cdot 5 - 105 = 0$$

$$125 - 375 + 5a - 105 = 0$$

$$5a = 355$$

$$a = 71$$

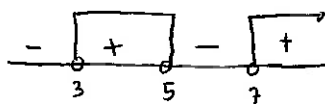
$$\therefore P(x) = x^3 - 15x^2 + 71x - 105$$

$$\text{agar } \log(P(x)) \text{ bernilai maka } P(x) > 0$$

$$x^3 - 15x^2 + 71x - 105 > 0$$

$$(x-5)(x-3)(x-7) > 0$$

$$x=5 \vee x=3 \vee x=7$$



$$\therefore \text{HP} = \{x \mid 3 < x < 5 \text{ atau } x > 7\}$$

(11)

$$\boxed{8} \quad P(x) = x^3 - (a+b+c)x^2 + (ab+bc+ac)x - abc$$

$$\Rightarrow x=a \rightarrow P(a) = a^3 - (a+b+c)a^2 + (ab+bc+ac)a - abc = 0$$

$$\Rightarrow x=b \rightarrow P(b) = b^3 - (a+b+c)b^2 + (ab+bc+ac)b - abc = 0$$

$$\Rightarrow x=c \rightarrow P(c) = c^3 - (a+b+c)c^2 + (ab+bc+ac)c - abc = 0$$

$$\Rightarrow a^3+b^3+c^3 - (a+b+c)(a^2+b^2+c^2) + (ab+bc+ac)(a+b+c) - 3abc = 0$$

$$\Rightarrow a^3+b^3+c^3 - (a+b+c)(a^2+b^2+c^2 - (ab+bc+ac)) - 3abc = 0$$

$$\Rightarrow a^3+b^3+c^3 - 3abc = (a+b+c)(a^2+b^2+c^2 - ab - bc - ac)$$

$\therefore (a+b+c)$ salah satu faktornya dan hasil baginya adalah $(a^2+b^2+c^2 - ab - bc - ac)$

$$\boxed{9} \quad \alpha, \beta, \gamma \text{ akar persamaan suku banyak berderajat 3}$$

$$\Rightarrow (x-\alpha)(x-\beta)(x-\gamma) = 0$$

$$(x^2 - \beta x - \alpha x + \alpha\beta)(x-\gamma) = 0$$

$$x^3 - \gamma x^2 - \beta x^2 + \beta\gamma x - \alpha x^2 + \alpha\gamma x + \alpha\beta x - \alpha\beta\gamma = 0$$

$$x^3 - (\alpha+\beta+\gamma)x^2 + (\alpha\beta+\alpha\gamma+\beta\gamma)x - \alpha\beta\gamma = 0$$

terbukti,,

10) a.) $2x^3 - 7x^2 + 7x - 2$

$$x_1 + x_2 + x_3 = \frac{7}{2} \left(-\frac{b}{a} \right)$$

$$x_1 x_2 x_3 = 1 \left(-\frac{d}{a} \right)$$

$$x_1 x_2 + x_1 x_3 + x_2 x_3 = \frac{7}{2} \left(\frac{c}{a} \right)$$

akar-akar $p(y)$ 2 kali akar-akar $p(x)$

$$y_1 + y_2 + y_3 = 7$$

$$y_1 y_2 y_3 = 2$$

$$y_1 y_2 + y_1 y_3 + y_2 y_3 = 7$$

$$\therefore a = 1, b = -7, c = 7, d = -2$$

$$p(y) = y^3 - 7y^2 + 7y - 2$$

b.) $x^3 + 6x^2 + 11x + 6 = 0$

$$x_1 + x_2 + x_3 = -6$$

$$x_1 x_2 + x_1 x_3 + x_2 x_3 = 11$$

$$x_1 x_2 x_3 = -6$$

akar-akar $p(y)$ berlawanan akar-akar $p(x)$

$$y_1 + y_2 + y_3 = 6$$

$$y_1 y_2 + y_1 y_3 + y_2 y_3 = -11$$

$$y_1 y_2 y_3 = 6$$

$$\therefore a = 1, b = -6, c = -11, d = -6$$

$$p(y) = y^3 - 6y^2 - 11y - 6$$

c.) $x^4 + 4x^3 + 22x^2 - 4x + 21 = 0$

$$x_1 + x_2 + x_3 + x_4 = -4$$

$$x_1 x_2 + x_1 x_3 + x_1 x_4 + x_2 x_3 + x_2 x_4 + x_3 x_4 = 22$$

$$x_1 x_2 x_3 + x_1 x_2 x_4 + x_1 x_3 x_4 + x_2 x_3 x_4 = 4$$

$$x_1 x_2 x_3 x_4 = 21$$

akar $p(y)$ berlawanan akar $p(x)$

$$y_1 + y_2 + y_3 + y_4 = 4$$

$$y_1 y_2 + y_1 y_3 + y_1 y_4 + y_2 y_3 + y_2 y_4 + y_3 y_4 = -22$$

$$y_1 y_2 y_3 + y_1 y_2 y_4 + y_1 y_3 y_4 + y_2 y_3 y_4 = -4$$

$$y_1 y_2 y_3 y_4 = -21$$

$$\therefore p(y) = y^4 - 4y^3 - 22y^2 + 4y - 21$$

11) a.) $x^2 - 3x + 2k = P(x)$

$$\Rightarrow P(-2) = (-2)^2 - 3(-2) + 2k = 7$$

$$4 + 6 + 2k = 7$$

$$2k = -3$$

$$k = -\frac{3}{2}$$

b.) $x^2 + kx + 4$

$$\Rightarrow P(1) = P(-1)$$

$$1^2 + k(1) + 4 = (-1)^2 + k(-1) + 4$$

$$k + 5 = -k + 5$$

$$2k = 0$$

$$k = 0$$

c.) $x^3 - kx^2 + 3x + 6k$

$$\Rightarrow P(-2) = (-2)^3 - k(-2)^2 + 3(-2) + 6k = 0$$

$$-8 - 4k - 6 + 6k = 0$$

$$2k = 14$$

$$k = 7$$

d.) $x^3 + 2x^2 - ax - b$

$$\Rightarrow P(-1) = (-1)^3 + 2(-1)^2 - a(-1) - b = 0$$

$$-1 + 2 + a - b = 0$$

$$a - b = -1$$

$$\Rightarrow P(2) = 2^3 + 2 \cdot 2^2 - a(2) - b = 0$$

$$8 + 8 - 2a - b = 0$$

$$-2a - b = -16$$

$$\Rightarrow -2a - b = -16$$

$$a - b = -1$$

$$-3a = -15$$

$$a = 5$$

$$\Rightarrow 5 - b = -1$$

$$b = 6$$

$$\therefore a = 5 \text{ \& } b = 6$$

12) a.) $3x^3 - 4x^2 - 5x + 2 = 0$
 $(3x-1)(x+1)(x-2) = 0$
 $x = \frac{1}{3} \vee x = -1 \vee x = 2$

$\therefore \text{Hp} = \left\{ -1, \frac{1}{3}, 2 \right\}$

b.) $x^4 + x^3 - 21x^2 - x + 20 = 0$
 $(x-1)(x+1)(x-4)(x+5) = 0$
 $x = 1 \vee x = -1 \vee x = 4 \vee x = -5$

$\therefore \text{Hp} = \{ -5, -1, 1, 4 \}$

c.) $6x^4 + x^3 - 23x^2 + 4x + 12 = 0$
 $(3x+2)(2x-3)(x-1)(x+2) = 0$
 $x = -\frac{2}{3} \vee x = \frac{3}{2} \vee x = 1 \vee x = -2$

$\therefore \text{Hp} = \left\{ -2, -\frac{2}{3}, 1, \frac{3}{2} \right\}$

d.) $5x^4 + 7x^3 - 31x^2 - 15x + 18 = 0$
 $(5x-3)(x+1)(x-2)(x+3) = 0$
 $x = \frac{3}{5} \vee x = -1 \vee x = 2 \vee x = -3$

$\therefore \text{Hp} = \left\{ -3, -1, \frac{3}{5}, 2 \right\}$

13) a.) $x^3 + 7x^2 - 3x + 9$ dibagi $x+2$

$$\begin{array}{r|rrrr} -2 & 1 & 7 & -3 & 9 \\ & & -2 & -10 & 26 \\ \hline & 1 & 5 & -13 & 35 \end{array}$$

$\therefore \text{Hasil bagi} = x^2 + 5x - 13$ dan
 Sisa = 35

b.) $4x^3 - 39x + 11$ dibagi $x-3$

$$\begin{array}{r|rrrr} 3 & 4 & 0 & -39 & 11 \\ & & 12 & 36 & -9 \\ \hline & 4 & 12 & -3 & 2 \end{array}$$

$\therefore \text{Hasil bagi} = 4x^2 + 12x - 3$ dan
 Sisa = 2

c.) $x^4 - 15x^2 + 11$ dibagi $x-4$

$$\begin{array}{r|rrrrr} 4 & 1 & 0 & -15 & 0 & 11 \\ & & 4 & 16 & 4 & 16 \\ \hline & 1 & 4 & 1 & 4 & 27 \end{array}$$

$\therefore \text{Hasil bagi} = x^3 + 4x^2 + x + 4$ dan
 Sisa = 27

d.) $x^7 + x^5 + x^3 + x$ dibagi $x-1$

$$\begin{array}{r|rrrrrrrr} 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ & & 1 & 1 & 2 & 2 & 3 & 3 & 4 \\ \hline & 1 & 1 & 2 & 2 & 3 & 3 & 4 & 4 \end{array}$$

$\therefore \text{Hasil bagi} = x^6 + x^5 + 2x^4 + 2x^3 + 3x^2 + 3x + 4$
 dan sisa = 4

e.) $4x^3 + 6x^2 - 1$ dibagi $2x+1$

$$\begin{array}{r|rrrr} -\frac{1}{2} & 4 & 6 & 0 & -1 \\ & & -2 & -2 & \\ \hline & 4 & 4 & -2 & 0 \end{array}$$

$\therefore \text{Hasil bagi} = 4x^2 + 4x - 2$ dan Sisa = 0

f.) $x^4 - 2x^2 - x + 7$ dibagi $x-2$

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & -2 & -1 & 7 \\ & & 2 & 4 & 4 & 6 \\ \hline & 1 & 2 & 2 & 3 & 13 \end{array}$$

$\therefore \text{Hasil bagi} = x^3 + 2x^2 + 2x + 3$ dan
 Sisa = 13

$$14) \quad 6x^3 - x^2 + ax + b$$

$$\Rightarrow P(2) = 6(2)^3 - (2)^2 + a(2) + b = 0$$

$$48 - 4 + 2a + b = 0$$

$$2a + b = -4$$

$$\Rightarrow P\left(-\frac{1}{2}\right) = 6\left(-\frac{1}{2}\right)^3 - \left(-\frac{1}{2}\right)^2 + a\left(-\frac{1}{2}\right) + b = 0$$

$$-\frac{6}{8} - \frac{1}{4} - \frac{a}{2} + b = 0$$

$$-1 - \frac{a}{2} + b = 0$$

$$-\frac{a}{2} + b = 1$$

$$\begin{array}{rcl} \Rightarrow & 2a + b = -4 & \Rightarrow 2(-2) + b = -4 \\ & -\frac{a}{2} + b = 1 & b = 0 \\ \hline & \frac{5}{2}a = -5 & \\ & a = -2 & \end{array}$$

$$\therefore a = -2, b = 0$$

$$15) a.) \quad 2x^3 - 3x^2 + ax + b \text{ habis dibagi } x+1$$

$$P(-1) = 2(-1)^3 - 3(-1)^2 + a(-1) + b = 0$$

$$-2 - 3 - a + b = 0$$

$$b = a + 5 \text{ terbacak}$$

$$b.) \quad P(x) = x^2 + 3x - 2$$

$$\Rightarrow P(-1) = (-1)^2 + 3(-1) - 2 = 1 - 3 - 2 = -4$$

$$Q(x) = x^3 - 4x^2 + 5x + P$$

$$\Rightarrow Q(-1) = (-1)^3 - 4(-1)^2 + 5(-1) + P = -10 + P$$

$$\Rightarrow P(-1) = Q(-1)$$

$$-4 = -10 + P$$

$$6 = P$$