

Uji Pemahaman Halaman 277

A. Pilihan Ganda

1. Fungsi $f(x) = \frac{2x+3}{x-1}$ akan selalu naik atau selalu turun

$$\bullet f(3) = \frac{2 \cdot 3 + 3}{3 - 1} = \frac{9}{2} = 4\frac{1}{2}$$

$$\bullet f(6) = \frac{2 \cdot 6 + 3}{6 - 1} = \frac{15}{5} = 3.$$

\therefore Daerah hasil $f(x)$ dengan daerah asal $3 \leq x \leq 6$ adalah

$$3 \leq y \leq 4\frac{1}{2}.$$

Jawaban: A.

2. Asimtot datar dari $f(x) = \frac{2x-3}{5x-1}$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{2x-3}{5x-1}$$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{2 - \frac{3}{x}}{5 - \frac{1}{x}}$$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{2-0}{5-0}$$

$$\equiv y = \frac{2}{5}$$

Jawaban: B.

3. $f(x+3) = \frac{23-7x}{5x-9}$

$$\Rightarrow f(5) = f(2+3) \\ = \frac{23-7(2)}{5(2)-9}$$

$$= \frac{9}{1}$$

$$= 9$$

Jawaban: B.

$$4. \bullet f(x+2) = \frac{4x-15}{7x-1}$$

$$\Leftrightarrow f(x+2) = \frac{4x+8-8-15}{7x+14-14-1}$$

$$\Leftrightarrow f(x+2) = \frac{4(x+2)-23}{7(x+2)-15}$$

$$\Leftrightarrow f(x) = \frac{4x-23}{7x-15}$$

$$\therefore \text{Asimtot tegak } f(x+2) = \frac{4x-15}{7x-1}$$

$$\equiv \text{Asimtot tegak } f(x) = \frac{4x-23}{7x-15}$$

$$\equiv 7x-15=0$$

$$\equiv x = \frac{15}{7}$$

Jawaban: A.

$$5. f(x) = \frac{ax+7}{cx+b}$$

$$\bullet f(-2) = 1 \Leftrightarrow 1 = \frac{-2a+7}{-0+b}$$

$$\Leftrightarrow -0+b = -2a+7$$

$$\Leftrightarrow 2a+b = 15 \dots \text{Pers (1)}$$

$$\bullet f(3) = -\frac{1}{7} \Leftrightarrow -\frac{1}{7} = \frac{3a+7}{12+b}$$

$$\Leftrightarrow -12-b = 21a+49$$

$$\Leftrightarrow 21a+b = -61 \dots \text{Pers (2)}$$

$$\bullet \text{Pers (2)} \Rightarrow 21a+b = -61$$

$$\text{Pers (1)} \Rightarrow \frac{2a+b=15}{19a=-76}$$

$$\Leftrightarrow a = -4$$

$$\bullet \text{Pers (1) dan } a = -4$$

$$\Rightarrow 2(-4)+b = 15 \Leftrightarrow b = 23$$

$$\therefore f(-4,5) = \frac{-4(-4,5)+7}{4(-4,5)+23}$$

$$= \frac{18+7}{-18+23} = \frac{25}{5} = 5$$

Jawaban: A.

Uji Pemahaman Halaman 279

$$\begin{aligned}
 6. \text{ Domain fungsi } f(x) &= \sqrt{5x-11} \\
 &\equiv 5x-11 \geq 0 \\
 &\equiv 5x \geq 11 \\
 &\equiv x \geq \frac{11}{5}
 \end{aligned}$$

Jawaban: E

$$\begin{aligned}
 7. \text{ Domain fungsi } f(x) &= \sqrt{x^2-7x+12} \\
 &\equiv x^2-7x+12 \geq 0 \\
 &\equiv (x-3)(x-4) \geq 0 \\
 &\equiv x \leq 3 \text{ atau } x \geq 4
 \end{aligned}$$

Jawaban: A.

$$\begin{aligned}
 8. \text{ Domain fungsi } f(x) &= \sqrt{\frac{x-3}{x-5}} \\
 &\equiv (x-3 \geq 0 \cap x-5 > 0) \cup \\
 &\quad (x-3 \leq 0 \cap x-5 < 0) \\
 &\equiv (x \geq 3 \cap x > 5) \cup \\
 &\quad (x \leq 3 \cap x < 5) \\
 &\equiv x > 5 \cup x \leq 3 \\
 &\equiv x \leq 3 \text{ atau } x > 5
 \end{aligned}$$

Jawaban: B.

$$\begin{aligned}
 9. \text{ Domain } h(x) &= \sqrt{f(x)+g(x)} \\
 &\equiv (\text{Domain } f(x)) \cap (\text{Domain } g(x)) \\
 &\quad \cap (\text{Domain } y = \sqrt{\frac{2x}{3x+6} + \frac{6-4x}{3x+6}}) \\
 &\equiv (3x+6 \neq 0) \cap (3x+6 \neq 0) \\
 &\quad \cap (\text{Domain } y = \sqrt{\frac{6-2x}{3x+6}}) \\
 &\equiv (x \neq -2) \cap \\
 &\quad ([(6-2x \geq 0) \cap (3x+6 > 0)] \\
 &\quad \cup [(6-2x \leq 0) \cap (3x+6 < 0)]) \quad \textcircled{2}
 \end{aligned}$$

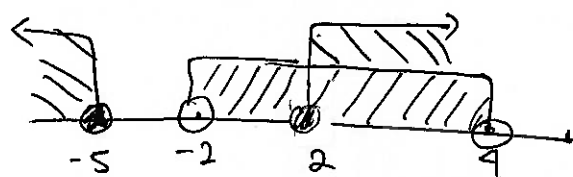
\therefore Domain $h(x)$

$$\begin{aligned}
 &\equiv (x \neq 2) \cap \\
 &\quad ([x \leq 3 \cap x > -2] \cup \\
 &\quad [x \geq 3 \cap x < -2]) \\
 &\equiv (x \neq 2) \cap (-2 < x \leq 3) \\
 &\equiv -2 < x \leq 3
 \end{aligned}$$

Jawaban: D

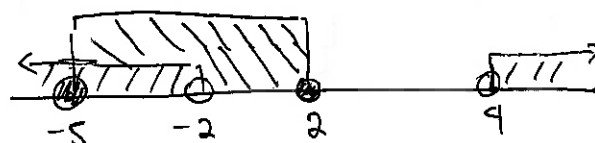
$$10. \text{ Domain } f(x) = \sqrt{\frac{x^2+3x-10}{x^2-2x-8}}$$

$$\begin{aligned}
 &\equiv (x^2+3x-10 \geq 0 \cap x^2-2x-8 > 0) \cup \\
 &\quad (x^2+3x-10 \leq 0 \cap x^2-2x-8 < 0) \\
 &\equiv ((x+5)(x-2) \geq 0 \cap (x-4)(x+2) < 0) \\
 &\quad \cup ((x+5)(x-2) \leq 0 \cap (x-4)(x+2) > 0) \\
 &\equiv ((x \leq -5 \cup x \geq 2) \cap -2 < x < 4) \\
 &\quad \cup (-5 \leq x \leq 2 \cap (x < -2 \cup x > 4)) \\
 &\circ ((x \leq -5) \cup x \geq 2) \cap 2 < x < 4
 \end{aligned}$$



$$\begin{aligned}
 &\therefore ((x \leq -5) \cup x \geq 2) \cap -2 < x < 4 \\
 &\equiv 2 \leq x < 4
 \end{aligned}$$

$$\circ -5 \leq x \leq 2 \cap (x < -2 \cup x > 4)$$



$$\begin{aligned}
 &\therefore -5 \leq x \leq 2 \cap (x < -2 \cup x > 4) \\
 &\equiv -5 \leq x < -2
 \end{aligned}$$

\therefore Domain $f(x)$

$$\equiv -5 \leq x < -2 \text{ atau } 2 \leq x < 4$$

Jawaban: D.

Uji Pemahaman Halaman 277

B. Uraian

$$1. \circ f(x) = \frac{19-x}{3x-5}$$

$$\Rightarrow f(2) = \frac{19-2}{3(2)-5} = \frac{17}{1} = 17$$

$$\Rightarrow f(6) = \frac{19-6}{3(6)-5} = \frac{13}{13} = 1$$

$$\therefore \text{Daerah hasil} = 1 \leq x \leq 17.$$

$$2. \text{Asimtot datar } f(x) = \frac{4-7x}{4x+15} + 2$$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{4-7x}{4x+15} + 2$$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{\frac{4}{x} - 7}{4 + \frac{15}{x}} + 2$$

$$\equiv y = \frac{0-7}{4+0} + 2$$

$$\equiv y = -\frac{7}{4} + \frac{8}{4}$$

$$\equiv y = \frac{1}{4}$$

$$3. \circ \text{Domain } f(x) = 3-x$$

$$\equiv x \in \mathbb{R}$$

$$\circ \text{Domain } g(x) = 2x-3$$

$$\equiv x \in \mathbb{R}.$$

$$a). \text{Domain } h(x) = \sqrt{f(x) \times g(x)}$$

$$\equiv \text{Domain } f(x) \cap \text{Domain } g(x) \cap$$

$$\text{Domain } y = \sqrt{(3-x)(2x-3)}$$

$$\equiv x \in \mathbb{R} \cap x \in \mathbb{R} \cap$$

$$(3-x)(2x-3) \geq 0$$

$$\equiv (x-3)(2x-3) \leq 0$$

$$\equiv \frac{3}{2} \leq x \leq 3$$

$$b). \text{Domain } h(x) = \sqrt{f(x)-g(x)}$$

$$\equiv \text{Domain } f(x) \cap \text{Domain } g(x) \cap$$

$$\text{Domain } y = (3-x) - (2x-3)$$

$$\equiv x \in \mathbb{R} \cap x \in \mathbb{R} \cap x \in \mathbb{R}$$

$$\equiv x \in \mathbb{R}$$

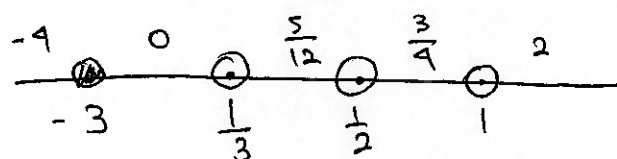
$$4. \circ x+3=0 (\Rightarrow) x=-3 \text{ y Pembilang}$$

$$\circ 1-x=0 (\Rightarrow) x=1$$

$$\circ 1-2x=0 (\Rightarrow) x=\frac{1}{2}$$

$$\circ 1-3x=0 (\Rightarrow) x=\frac{1}{3}$$

Penyebut



$$\circ \text{Domain } f(x) = \sqrt{\frac{x+3}{(1-x)(1-2x)(1-3x)}}$$

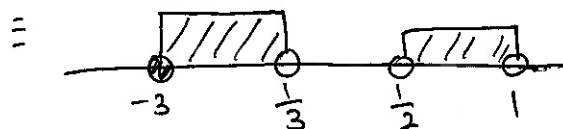
$$\equiv \frac{x+3}{(1-x)(1-2x)(1-3x)} \geq 0$$

o Pengujian nilai

* Positif = P
negatif = n.

	-4	0	$\frac{5}{12}$	$\frac{3}{4}$	2
$x+3$	n	P	P	P	P
$1-x$	P	P	P	P	n
$1-2x$	P	P	P	n	n
$1-3x$	P	P	n	n	n
$f(x)$	n	P	n	P	n

$$\therefore \text{Domain } f(x)$$



$$\equiv -3 \leq x < \frac{1}{3} \text{ atau } \frac{1}{2} \leq x < 1$$

Uji Pemahaman Halaman 277

5.a). $f(x) = \frac{4x+7}{5x+9}$

• Titik potong $f(x)$ dengan Sumbu x

$$0 = \frac{4x+7}{5x+9} \Leftrightarrow 4x+7=0$$

$$\Leftrightarrow x = -\frac{7}{4} = -1,75$$

• Titik potong $f(x)$ dengan Sumbu y

$$f(0) = \frac{4(0)+7}{5(0)+9} = \frac{7}{9} = 0,77$$

$$\therefore (0, \frac{7}{9})$$

• Asimtot datar $f(x)$

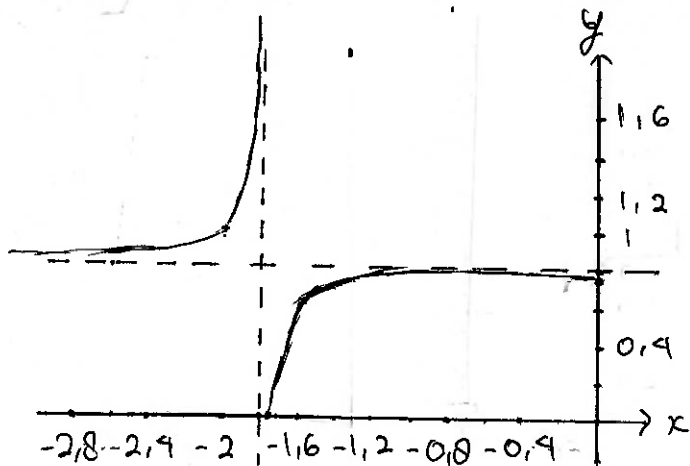
$$y = \lim_{x \rightarrow \infty} \frac{4x+7}{5x+9}$$

$$\Leftrightarrow y = \lim_{x \rightarrow \infty} \frac{4 + \frac{7}{x}}{5 + \frac{9}{x}}$$

$$\Leftrightarrow y = \frac{4}{5} = 0,8$$

• Asimtot tegak $f(x)$

$$5x+9=0 \Leftrightarrow x = -\frac{9}{5} = -1,8$$



$$f(-1,6) = \frac{4(-1,6)+7}{5(-1,6)+9} = \frac{-6,4+7}{-8+9} = 0,6$$

$$f(-2) = \frac{4(-2)+7}{5(-2)+9} = \frac{-1}{-1} = 1$$

b). • Asimtot datar $y = -\frac{2x+11}{4x-3}$

$$\equiv y = \lim_{x \rightarrow \infty} \frac{2x+11}{4x-3}$$

$$\equiv y = \frac{1}{2}$$

• Asimtot tegak $y = \frac{2x+11}{4x-3}$

$$\equiv 4x-3=0$$

$$\equiv x = \frac{3}{4}$$

$$\bullet \text{ Domain } f(x) = \sqrt{\frac{2x+11}{4x-3}}$$

$$\equiv (2x+11 \geq 0) \cap (4x-3 > 0) \cup$$

$$(2x+11 \leq 0) \cap (4x-3 < 0)$$

$$\equiv (x \geq -\frac{11}{2} \cap x > \frac{3}{4}) \cup$$

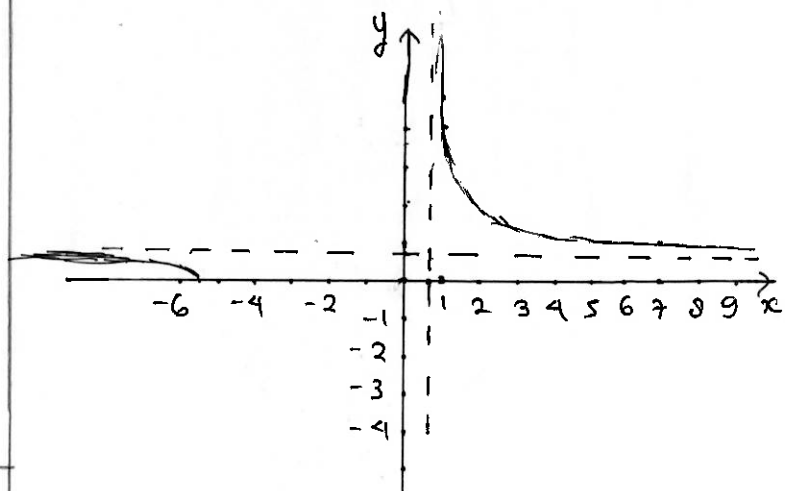
$$(x \leq -\frac{11}{2} \cap x < \frac{3}{4})$$

$$\equiv x \leq -\frac{11}{2} \text{ atau } x > \frac{3}{4}$$

$$\therefore \text{ Asimtot datar } f(x) = \sqrt{\frac{2x+11}{4x-3}}$$

$$\equiv y = \sqrt{\frac{1}{2}} = \frac{1}{2}\sqrt{2}$$

$$\bullet f(7) = \sqrt{\frac{2(7)+11}{4(7)-3}} = \sqrt{\frac{25}{25}} = 1$$



Uji Pemahaman Halaman 282

A. Pilihan Ganda

1. $|x+5|=0 \Leftrightarrow x+5=0 \Leftrightarrow x=-5$

\therefore Titik balik dari $y=|x+5|+2$.

ketika $(-5, y(-5)) = (-5, 2)$

Jawaban: A.

2. Misalkan fungsi pada soal ini berbentuk

$$y = a|x-b|+c$$

• Titik balik fungsi mutlak $= (-8, -9)$

$$\Rightarrow y = a|x-(-8)|+(-9)$$

$$\Leftrightarrow y = a|x+8|-9$$

• $(-7, -8)$ ada di garis fungsi

$$\Rightarrow -8 = a|-7+8|-9$$

$$\Rightarrow -4 = a$$

$$\therefore \text{fungsi mutlak} \equiv y = -4|x+8|-9$$

Jawaban: C.

3. menangkap ikan dari permukaan

$$\Rightarrow f(s)=0 \Leftrightarrow 6|s-237|=432=0$$

$$\Leftrightarrow 6|s-237|=432$$

$$\Leftrightarrow |s-237|=72$$

$$\therefore s-237=72 \text{ atau } s-237=-72$$

$$s=309 \text{ atau } s=165$$

\therefore Jangkauan kedalaman untuk menangkap ikan tersebut dari permukaan antara 165 meter dan 309 meter

Jawaban: D.

4. (i) $f(x) = x^7 + x^5$

$$\Rightarrow f(-x) = (-x)^7 + (-x)^5$$

$$= -x^7 + (-x^5)$$

$$= -(x^7 + x^5)$$

$$= -f(x)$$

\therefore Fungsi ganjil

(ii) $f(x) = (x^2-1)^2$

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

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

$$= f(x)$$

\therefore Fungsi genap

(iii) $f(x) = x + \frac{1}{x}$

$$f(-x) = -x + \frac{1}{-x}$$

$$= -\left(x + \frac{1}{x}\right)$$

$$= -f(x)$$

\therefore Fungsi ganjil

(iv). $f(x) = \sqrt{4-x^2}$

$$\Rightarrow f(-x) = \sqrt{4-(-x)^2}$$

$$= \sqrt{4-x^2}$$

$$= f(x)$$

\therefore Fungsi genap

\therefore yang merupakan fungsi ganjil adalah (i) dan (iii)

Jawaban: C.

5. $f(x) = 4x^2 + x + 5 \Rightarrow f(-x) = 4x^2 - x + 5 \neq f(x)$

• $f(x) = 3x^2 + x + 9 \Rightarrow f(-x) = 3x^2 - x + 9 \neq f(x)$

• $f(x) = 2x + 3 \Rightarrow f(-x) = -2x + 3 \neq f(x)$

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

• $f(x) = 4x^3 + 1 \Rightarrow f(-x) = -4x^3 + 1 \neq f(x)$

\therefore Fungsi yang merupakan fungsi genap adalah $f(x) = 3x^2 + 2$.

Jawaban: D.

Uji Pemahaman Halaman 282

6. $f(x) = x^4 + x^2$

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

• $f(x) = x^3 + 2x$

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

• $f(x) = x^2 + 3$

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

• $f(x) = x^3 + 4$

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

$\therefore f(-x) \neq f(x)$ dan

$f(-x) \neq -f(x)$

• $f(x) = x^5 + 5x^3$

$\Rightarrow f(-x) = (-x)^5 + 5(-x)^3 = -x^5 - 5x^3$

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

\therefore Fungsi yang merupakan bukan fungsi ganjil dan bukan fungsi genap adalah $f(x) = x^3 + 4$

Jawaban: D

7. $h(3) \times h(-3) + h(2)$

$= 2 \times 0 + 1$

$= 1$

Jawaban: C.

8. $g(-7) = 0$ karena $-7 < -3$

$g(-5) = 0$ karena $-5 < -3$

$g(-4) = 0$ karena $-4 < -3$

$g(-3) = 3(-3) + 2 = -7 \neq 0$

$g(2) = 3(2) + 2 = 8$

Salah satu nilai x yang tidak membuat fungsi g bernilai 0 adalah $x = -3$

Jawaban: D.

9. $g(-2) = (-2)^2 - (-2)$ karena $-3 < -2 \leq 4$.

$= 4 + 2$

$= 6$.

Jawaban: E

10. $f(x) = \begin{cases} 1, & \text{untuk } x \leq 0 \\ x^2 + x - 5, & \text{untuk } 0 < x < 2 \\ -1, & \text{untuk } x \text{ yang lain.} \end{cases}$

$(f \circ f \circ f)(2) = f(f(f(2)))$

$= f(f(-1))$

$= f(1)$

$= 1^2 + 1 - 5$

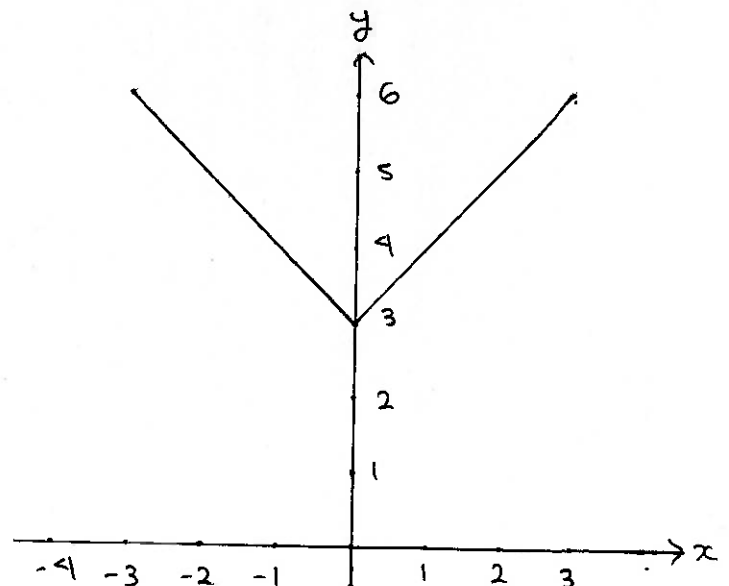
$= -3$

Jawaban: A.

B. Uraian

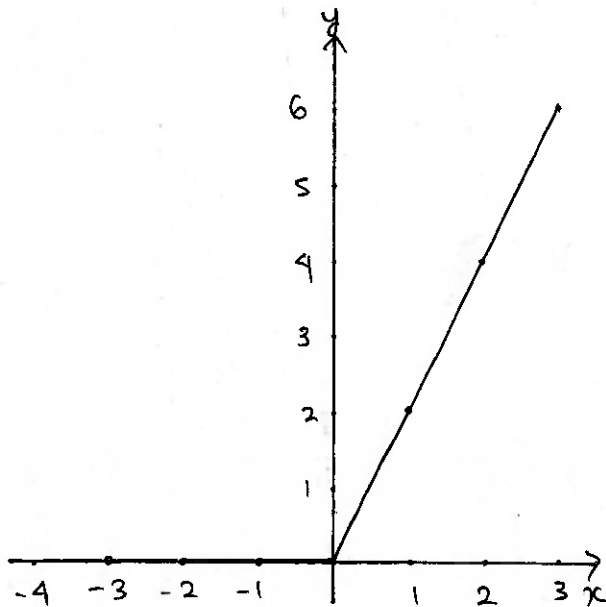
1. a). $f(x) = |x| + 3$

x	-3	-2	-1	0	1	2	3
$f(x)$	6	5	4	3	4	5	6



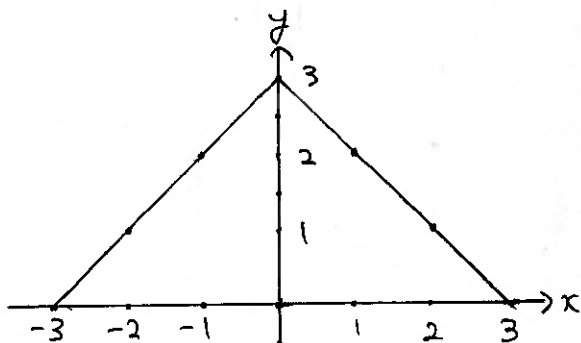
b). $f(x) = x + |x|$

x	-3	-2	-1	0	1	2	3
$f(x)$	0	0	0	0	2	4	6



c). $f(x) = -|x| + 3$

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



d). $f(x) = [x] + 2$, untuk

• $-3 \leq x \leq -2 \Rightarrow 2 \leq |x| \leq 3$

$\Leftrightarrow [x] = 2$

$\Leftrightarrow [x] + 2 = 4$

• $-2 < x \leq -1 \Rightarrow 1 \leq |x| < 2$

$\Leftrightarrow [x] = 1$

$\Leftrightarrow [x] + 2 = 3$

• $-1 < x \leq 0 \Rightarrow [x] + 2 = 2$

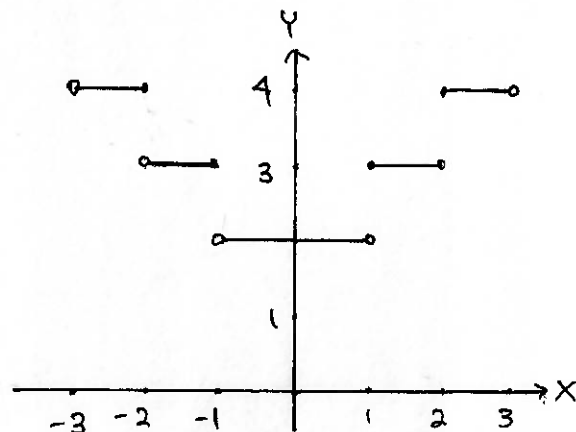
• $0 < x < 1 \Rightarrow 0 < |x| < 1$

$\Leftrightarrow [x] = 0$

$\Leftrightarrow [x] + 2 = 2$

• $1 \leq x < 2 \Rightarrow [x] + 2 = 3$

• $2 \leq x < 3 \Rightarrow [x] + 2 = 4$



e). $f(x) = [x+2]$, untuk

• $x = -3 \Rightarrow [x+2] = 1$

• $-3 < x < -2 \Leftrightarrow -1 < x+2 < 0$

$\Leftrightarrow 0 < |x+2| < 1$

$\Rightarrow [x+2] = 0$

• $x = -2 \Rightarrow [x+2] = 0$

• $-2 < x < -1 \Leftrightarrow 0 < x+2 < 1$

$\Leftrightarrow 0 < |x+2| < 1$

$\Rightarrow [x+2] = 0$

• $x = -1 \Rightarrow [x+2] = 1$

• $-1 < x < 0 \Rightarrow 1 < |x+2| < 2$

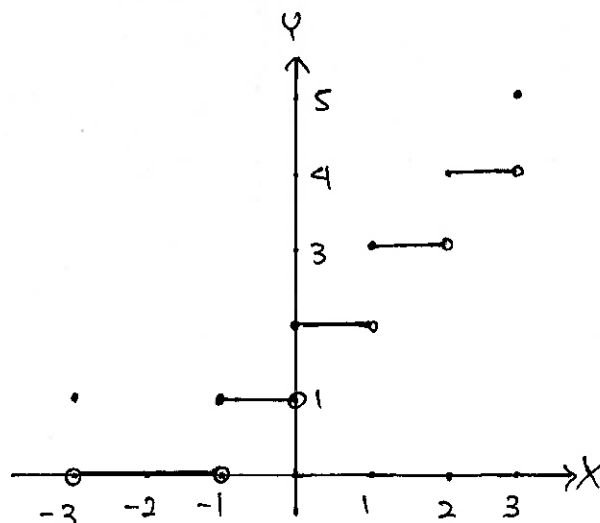
$\Rightarrow [x+2] = 1$

• $0 \leq x < 1 \Rightarrow [x+2] = 2$

• $1 \leq x < 2 \Rightarrow [x+2] = 3$

• $2 \leq x < 3 \Rightarrow [x+2] = 4$

• $x = 3 \Rightarrow [x+2] = 5$



Uji Pemahaman Halaman 282

f). $f(x) = [|x| + x]$, untuk

• $x = -3 \Rightarrow |x| + x = -(-3) + (-3) = 0$

• $x < 0 \Rightarrow |x| + x = -x + x = 0$

• $x = 0 \Rightarrow |x| + x = 0$

$\Rightarrow x \leq 0 \Rightarrow f(x) = 0$

• $x > 0 \Rightarrow |x| + x = x + x = 2x$

$\Rightarrow f(x) = [|x| + x] = [2x]$

$\Rightarrow 0 < x < 0,5 \Rightarrow f(x) = 0$

• $0,5 \leq x < 1 \Rightarrow f(x) = 1$

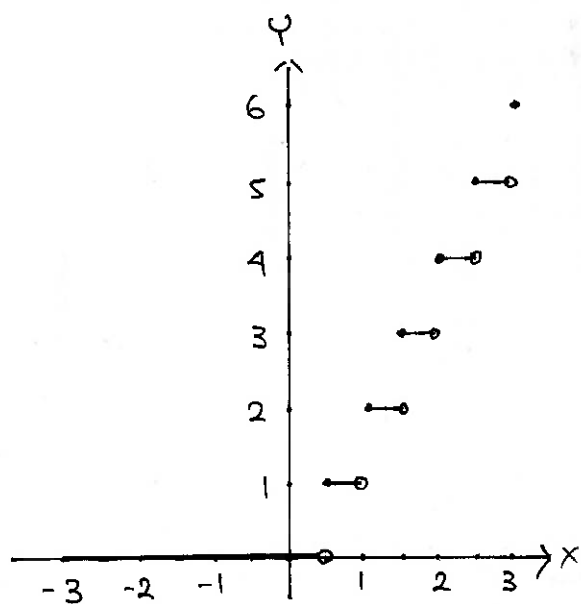
• $1 \leq x < 1,5 \Rightarrow f(x) = 2$

• $1,5 \leq x < 2 \Rightarrow f(x) = 3$

• $2 \leq x < 2,5 \Rightarrow f(x) = 4$

• $2,5 \leq x < 3 \Rightarrow f(x) = 5$

• $x = 3 \Rightarrow f(x) = 6$



g). $f(x) = [|x| - x]$

• $x < 0 \Rightarrow f(x) = [-x - x] = [-2x]$

• $x \geq 0 \Rightarrow f(x) = [x - x] = 0$

• $-0,5 < x < 0 \Rightarrow f(x) = 0$

• $-1 < x \leq -0,5 \Rightarrow f(x) = 1$

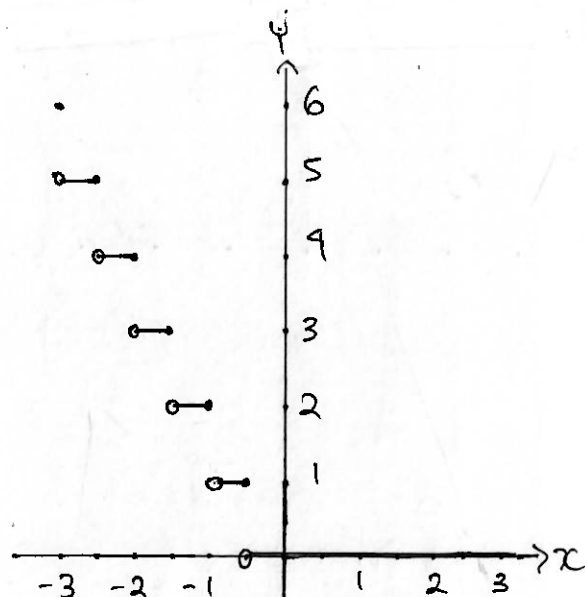
• $-1,5 < x \leq -1 \Rightarrow f(x) = 2$

• $-2 < x \leq -1,5 \Rightarrow f(x) = 3$

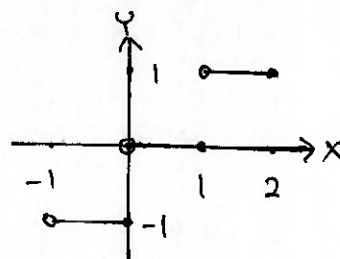
• $-2,5 < x \leq -2 \Rightarrow f(x) = 4$

• $-3 < x \leq -2,5 \Rightarrow f(x) = 5$

• $x = -3 \Rightarrow f(x) = 6$



h). $f(x) = \begin{cases} -1, & \text{untuk } -1 < x \leq 0 \\ 0, & \text{untuk } 0 < x \leq 1 \\ 1, & \text{untuk } 1 < x \leq 2 \end{cases}$

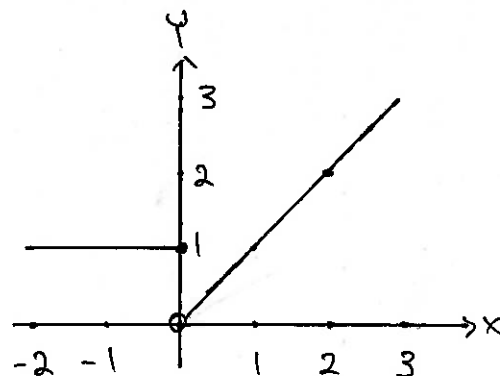


i). $f(x) = \begin{cases} 1, & x \leq 0 \\ x, & x > 0 \end{cases}$

• $x = 1 \Rightarrow f(1) = 1$

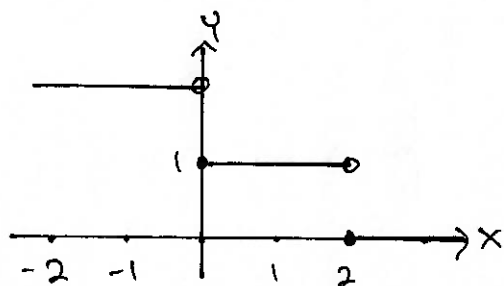
• $x = 2 \Rightarrow f(2) = 2$

• $x = 0 \Rightarrow f(0) = 0, 1$



Uji Pemahaman Halaman 282

d). $f(x) = \begin{cases} 2, & \text{untuk } x < 0 \\ 1, & \text{untuk } 0 \leq x < 2 \\ 0, & \text{untuk } x \geq 2 \end{cases}$



2. a). $f(x) = x^2$

$\Rightarrow f(-x) = (-x)^2 = x^2 = f(x)$

$\therefore f(x)$ fungsi genap

b). $f(x) = \sqrt{9-x^2}$

$\Rightarrow f(-x) = \sqrt{9-(-x)^2} = \sqrt{9-x^2} = f(x)$

$\therefore f(x)$ fungsi genap untuk

$9-x^2 \geq 0 \Leftrightarrow -3 \leq x \leq 3$

c). $f(x) = 3x + \frac{1}{3x}$

$\Rightarrow f(-x) = 3(-x) + \frac{1}{3(-x)}$

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

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

$= -f(x)$

$\therefore f(x)$ fungsi ganjil dengan $x \neq 0$

d). $f(x) = \frac{x}{x^2+1}$

$\Rightarrow f(-x) = \frac{-x}{(-x)^2+1} = -\frac{x}{x^2+1} = -f(x)$

$\therefore f(x)$ fungsi ganjil.

3. Pecah x menjadi bil. bulat dan desimal
 \Rightarrow misalkan $x = a + b$ dimana

a bilangan bulat dan b adalah bagian desimal ($0 < b < 1$).

karena b positif $\Rightarrow [x] = a$

$\Rightarrow f(x) = x - [x] = (a+b) - a = b$

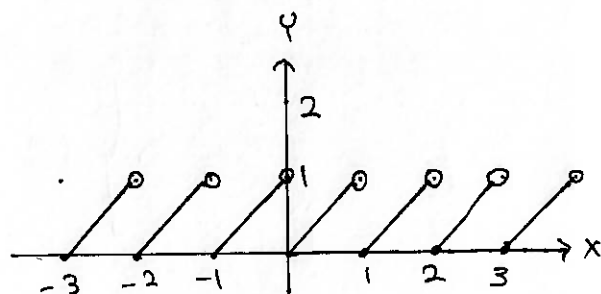
$\therefore f(x)$ = bagian desimal dari x .

contoh: $f(1,5) = 0,5$

$f(-1,5) = f(-2+0,5) = 0,5$

$f(-1,3) = f(-2+0,7) = 0,7$.

a).



b). Lihatlah grafik f

• Tidak simetris terhadap sumbu y

$\Rightarrow f$ bukan fungsi genap

• Tidak ada di bawah sumbu x

$\Rightarrow f$ bukan fungsi ganjil

c). Iya fungsi periodik

d). karena pengulangan nilai $f(x)$ untuk

$-3 \leq x < -2$; $-2 \leq x < -1$;

$-1 \leq x < 0$; $0 \leq x < 1$; ...

mengalami pengulangan dengan jarak 1 dan mempunyai nilai yang sama

$\Rightarrow f$ fungsi periodik dengan periode 1 (satu).

Uji Pemahaman 202

4.
$$f(x) = \begin{cases} x+1, & \text{untuk } x \leq 1 \rightarrow \text{I} \\ 2, & \text{untuk } 1 < x \leq 3 \rightarrow \text{II} \\ 2x-3, & \text{untuk } x > 3 \rightarrow \text{III} \end{cases}$$

a) $f(0) = 0+1 = 1 \Rightarrow f(0) = 1$ } I

$\bullet f(1) = 1+1 = 2 \Rightarrow f(1) = 2$ }

$\bullet f(2) = 2$

$\bullet f(2\frac{1}{2}) = 2$ } II

$\bullet f(3) = 2$

$\bullet f(3\frac{1}{2}) = 2(3\frac{1}{2}) - 3 = 4 \Rightarrow f(3\frac{1}{2}) = 4$ } III

b) (i) $D_f = \{x \mid -1 \leq x \leq 0, x \in \mathbb{R}\}$

$\bullet -1 \leq x \leq 0$

$\Leftrightarrow -1+1 \leq x+1 \leq 0+1$

$\Leftrightarrow 0 \leq f(x) \leq 1$

$\therefore R_f = \{f(x) \mid 0 \leq f(x) \leq 1\}$

(ii) $D_f = \{x \mid -2 \leq x \leq 1, x \in \mathbb{R}\}$

$\bullet -2 \leq x \leq 1$

$\Leftrightarrow -2+1 \leq x+1 \leq 1+1$

$\Leftrightarrow -1 \leq f(x) \leq 2$

$\therefore R_f = \{f(x) \mid -1 \leq f(x) \leq 2\}$

(iii) $D_f = \{x \mid 1 \leq x \leq 2, x \in \mathbb{R}\}$

$\bullet x=1 \Rightarrow f(1) = 1+1 = 2$

$\bullet 1 < x \leq 2 \Rightarrow f(x) = 2$

$\therefore R_f = \{2\}$

(iv) $D_f = \{x \mid 2 \leq x \leq 3, x \in \mathbb{R}\}$

$\bullet 1 < 2 \leq x \leq 3 \Rightarrow f(x) = 2$

$\therefore R_f = \{2\}$

5. misalkan $a > 0$; $b > 2$; $0 < c < 2$

a) $\bullet f(a) = a^2 - 2a$

$\bullet f(-a) = -(-a)^2 - 2(-a)$

$= -a^2 + 2a$

$= -(a^2 - 2a) = -f(a)$

$\therefore f(-a) = -f(a)$

$\therefore f$ merupakan fungsi ganjil

b) $\bullet f(b) = b^2 - 2b$

$\bullet f(-b) = (-b)^2 + 2(-b)$

$= b^2 - 2b$

$= f(b)$

$\bullet f(c) = -c^2 + 2c$

$\bullet f(-c) = -(-c)^2 - 2(-c)$

$= -c^2 + 2c$

$= f(c)$

a) $f(-b) = f(b)$; $f(-c) = f(c)$

$\therefore f$ merupakan fungsi genap

Uji Pemahaman Halaman 207

A. Pilihan Ganda

1. Misalkan $y = a \cdot b^x + c$

• karena asimtot datar $\equiv y = 0$
 $\Rightarrow c = 0 \Rightarrow y = a \cdot b^x$

• $(0, \frac{1}{2})$ ada di kurva

$$\Rightarrow a = \frac{1}{2} \Rightarrow y = \frac{1}{2} \cdot b^x$$

• $(1, \frac{1}{4})$ ada di kurva

$$\Rightarrow \frac{1}{4} = \frac{1}{2} \cdot b^1 \Leftrightarrow b = \frac{1}{2}$$

$$\therefore y = \frac{1}{2} \left(\frac{1}{2}\right)^x$$

$$\Leftrightarrow y = \left(\frac{1}{2}\right)^{x+1}$$

Jawaban: B.

2. Misalkan fungsi eksponensial (F.e)

$$\equiv y = a \cdot b^x + c \text{ [fungsinya turun]}$$

• Asimtot datar $\equiv y = 2 \Rightarrow c = 2$

$$\Rightarrow \text{F.e} \equiv y = a \cdot b^x + 2$$

• $(0, 4)$ ada di kurva

$$\Rightarrow 4 = a + 2 \Leftrightarrow a = 2$$

$$\Rightarrow \text{F.e} = y = 2 \cdot b^{-x} + 2$$

\therefore Bentuk fungsi yang mendekati

$$\equiv y = 2^{-x+1} + 2$$

Jawaban: C.

3. $y = f(x) = 2^x - 1 \equiv$ kurva l

$$\bullet f(0) = 2^0 - 1 = 0 \Rightarrow (0, 0) \in l$$

$$\bullet f(1) = 2^1 - 1 = 1 \Rightarrow (1, 1) \in l$$

$$\bullet f(2) = 2^2 - 1 = 3 \Rightarrow (2, 5) \notin l$$

$$\bullet f(3) = 2^3 - 1 = 7 \Rightarrow (3, 7) \in l$$

$$\bullet f(4) = 2^4 - 1 = 15 \Rightarrow (4, 15) \in l$$

Jawaban: C.

$$4. l \equiv y = k \cdot 2^{b \cdot x}$$

$$\bullet (0, 1) \in l \Rightarrow 1 = k \cdot 2^{b(0)}$$

$$\Leftrightarrow 1 = k \cdot 2^0$$

$$\Leftrightarrow k = 1$$

$$\Rightarrow l = y = 2^{bx}$$

$$\bullet (2, 8) \in l \Rightarrow 8 = 2^{b(2)}$$

$$\Leftrightarrow 2^3 = 2^{2b}$$

$$\Leftrightarrow 3 = 2b$$

$$\Leftrightarrow b = \frac{3}{2}$$

Jawaban: C.

$$5. \text{F.e} \equiv y = \left(\frac{1}{2}\right)^{x+1} - 4$$

• Perpotongan F.e dan sumbu x ($y = 0$)

$$\Rightarrow 0 = \left(\frac{1}{2}\right)^{x+1} - 4$$

$$\Leftrightarrow 4 = \left(\frac{1}{2}\right)^{x+1}$$

$$\Leftrightarrow \left(\frac{1}{2}\right)^{-2} = \left(\frac{1}{2}\right)^{x+1}$$

$$\Leftrightarrow -2 = x+1$$

$$\Leftrightarrow x = -3$$

\therefore Perpotongan F.e dan sumbu x
 $= (-3, 0)$

• Perpotongan F.e dan sumbu y ($x = 0$)
 $= (0, b)$

$$\Rightarrow b = \left(\frac{1}{2}\right)^{0+1} - 4$$

$$\Leftrightarrow b = \frac{1}{2} - 4$$

$$\Leftrightarrow b = -\frac{7}{2}$$

\therefore Perpotongan F.e dan sumbu y
 $= (0, -\frac{7}{2})$

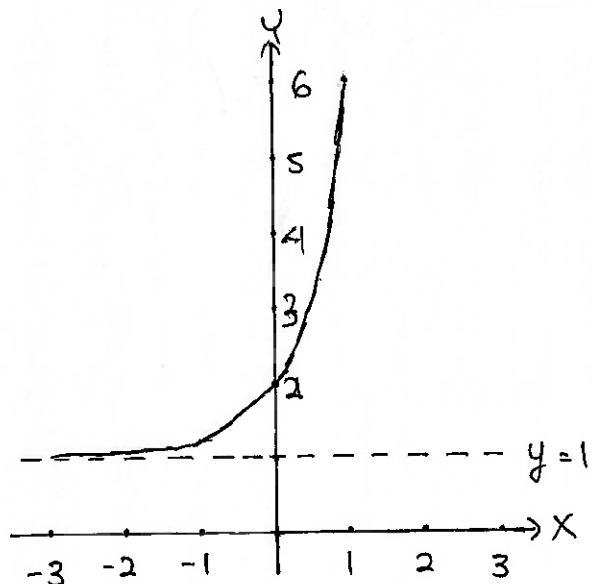
Jawaban: C.

Uji Pemahaman Halaman 207

B. Uraian

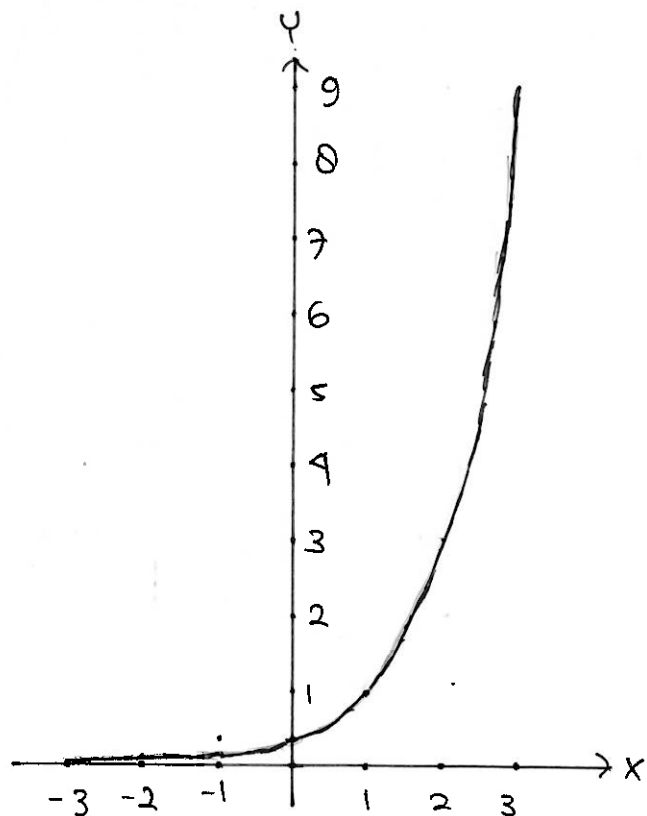
1. a). $f(x) = 5^x + 1 \rightarrow$ asimtot datar $\hat{=} y = 1$

x	-2	-1	0	1
f(x)	$1\frac{1}{25}$	$1\frac{1}{5}$	2	6



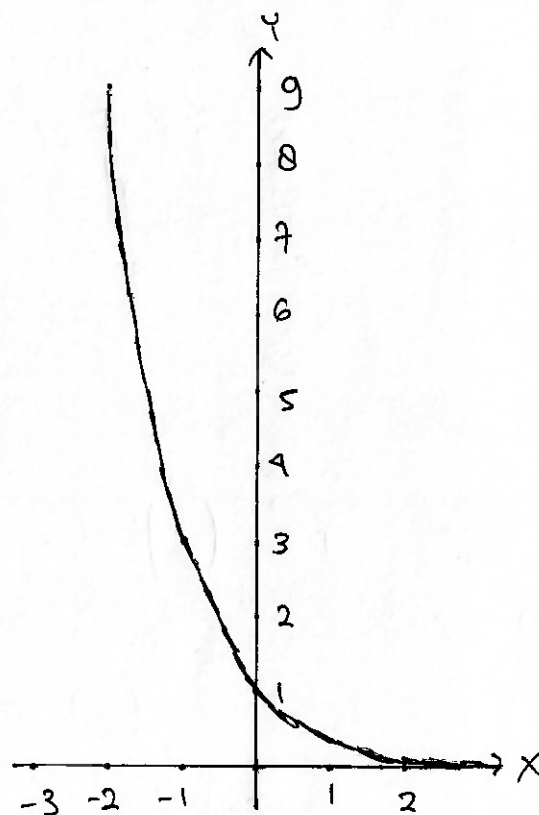
b). $f(x) = 3^{x-1} \rightarrow$ asimtot datar $\hat{=} y = 0$

x	-2	-1	0	1	2	3
f(x)	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9



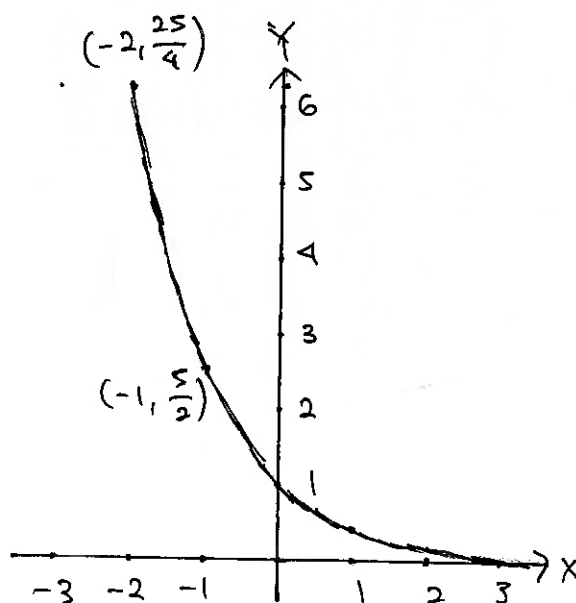
c). $f(x) = \left(\frac{1}{3}\right)^x \rightarrow$ asimtot datar $\hat{=} y = 0$

x	-2	-1	0	1	2
f(x)	9	3	1	$\frac{1}{3}$	$\frac{1}{9}$



d). $f(x) = \left(\frac{2}{5}\right)^x \rightarrow$ Asimtot datar $\hat{=} y = 0$

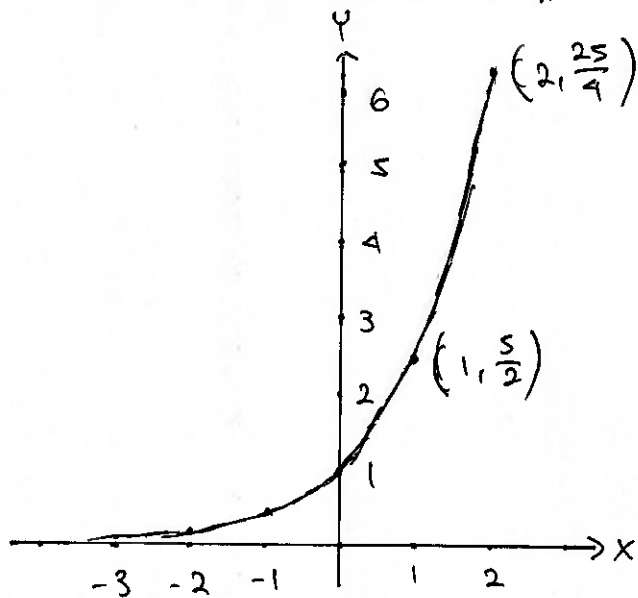
x	-2	-1	0	1	2
f(x)	$\frac{25}{4}$	$\frac{5}{2}$	1	$\frac{2}{5}$	$\frac{4}{25}$



Uji Pemahaman Halaman 287.

e). $f(x) = \left(\frac{5}{2}\right)^x \rightarrow$ Asimtot datar $y=0$

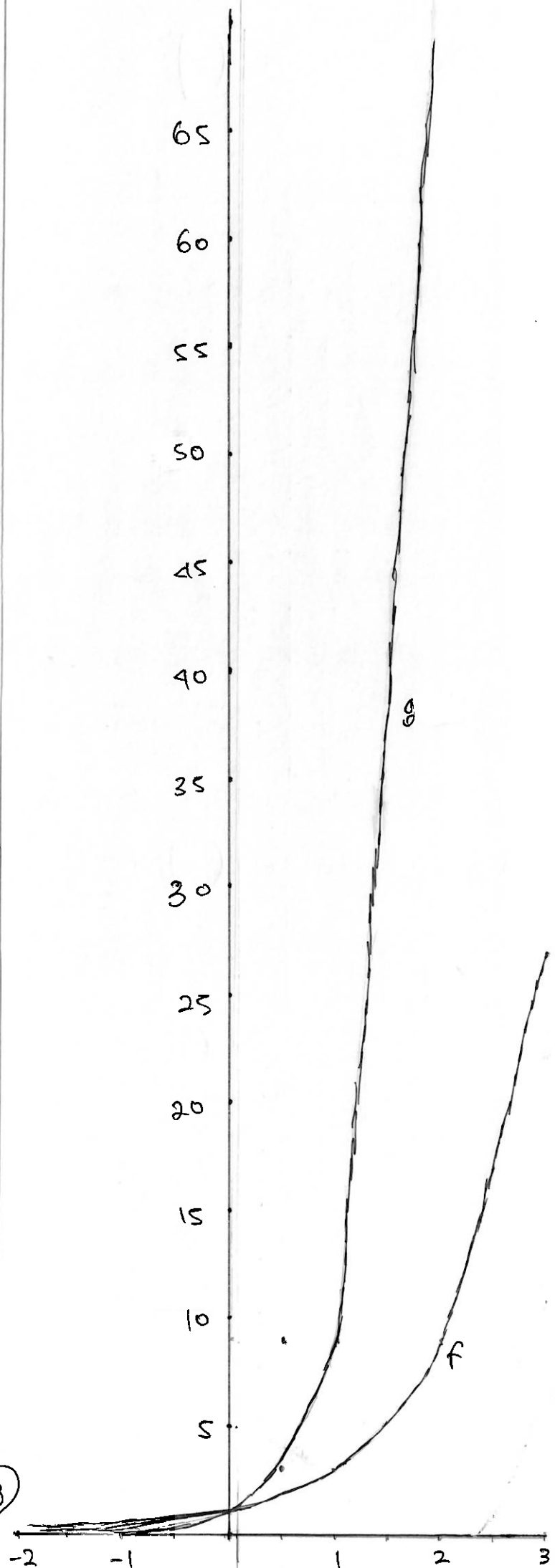
x	-2	-1	0	1	2
$f(x)$	$\frac{4}{25}$	$\frac{2}{5}$	1	$\frac{5}{2}$	$\frac{25}{4}$



2. $f(x) = 3^x$; $g(x) = 9^x$

x	-2	-1	0	1	2	3
$f(x)$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27
$g(x)$	$\frac{1}{81}$	$\frac{1}{9}$	1	9	81	729

(13)



Uji Pemahaman Halaman 207

3.a). $(m, 27)$ ada di kurva $y = 3^{(2x)}$

$$\Rightarrow 27 = 3^{2m}$$

$$\Leftrightarrow 3^3 = 3^{2m}$$

$$\Leftrightarrow 3 = 2m$$

$$\Leftrightarrow m = \frac{3}{2}$$

b). $P(27, c)$ ada di kurva $y = \frac{1}{3} \log x$.

$$\Rightarrow c = \frac{1}{3} \log 27$$

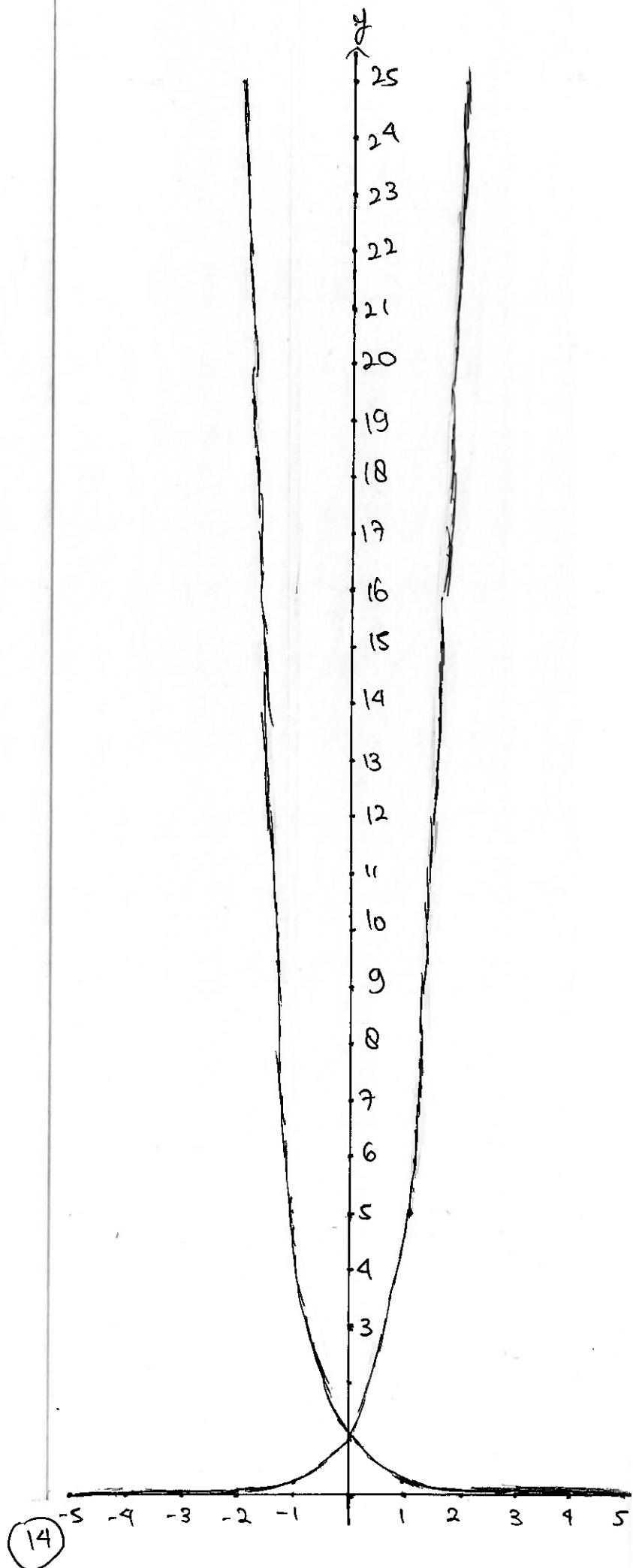
$$c = \frac{1}{3} \log (3^3)$$

$$\Leftrightarrow c = -3$$

$$\therefore P(27, -3).$$

4. $f(x) = 5^x$; $g(x) = \left(\frac{1}{5}\right)^x$.

x	$f(x)$	$g(x)$
-5	$\frac{1}{3.125}$	3.125
-4	$\frac{1}{625}$	625
-3	$\frac{1}{125}$	125
-2	$\frac{1}{25}$	25
-1	$\frac{1}{5}$	5
0	1	1
1	5	$\frac{1}{5}$
2	25	$\frac{1}{25}$
3	125	$\frac{1}{125}$
4	625	$\frac{1}{625}$
5	3.125	$\frac{1}{3.125}$



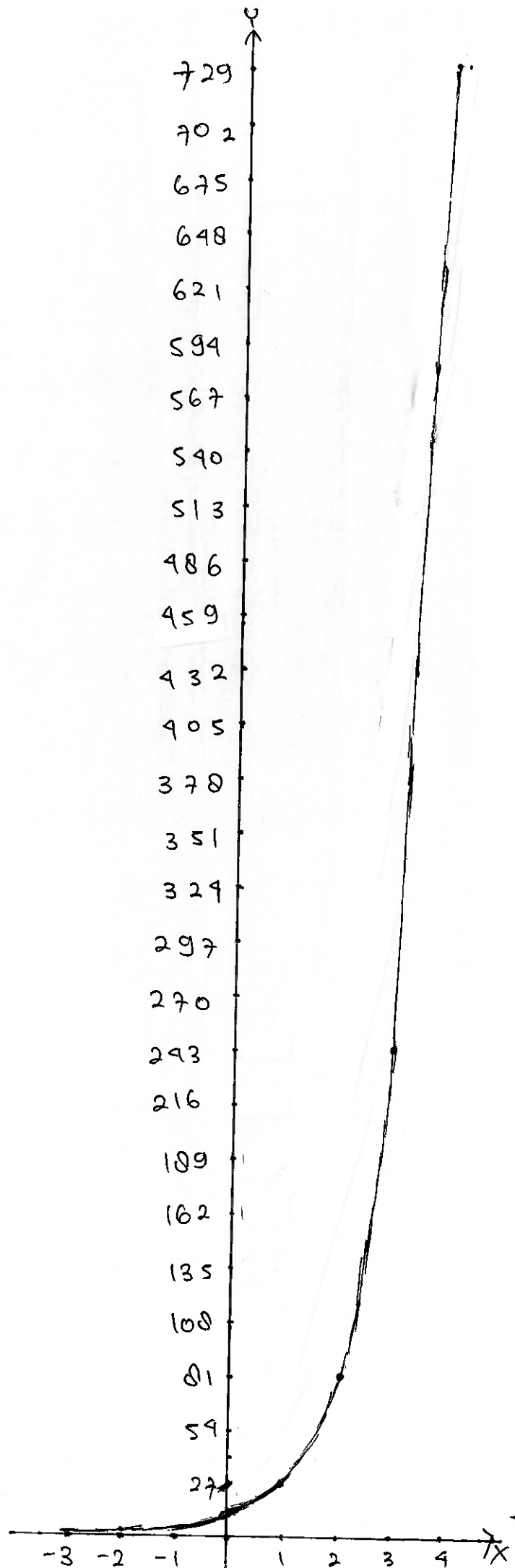
Uji Pemahaman Halaman 287

- Bentuk kurva f dan g seperti kurva yang telah dicerminkan
- Sumbu simetri kurva f dan g adalah sumbu Y .
- Berdasarkan tabel
 \Rightarrow Titik persekutuan f dan g
 $= (0, 1)$.

5. $y = 3^{x+2}$.

x	y
-3	$\frac{1}{3}$
-2	1
-1	3
0	9
1	27
2	81
3	243
4	729

15



Uji Pemahaman Halaman 287

a). Berdasarkan tabel dan grafik

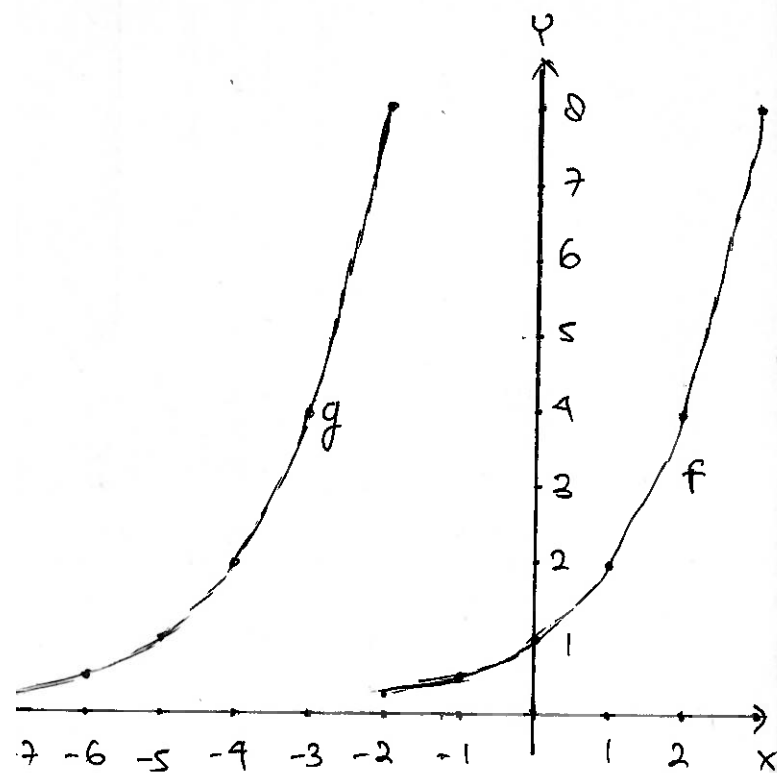
\therefore Titik potong kurva dengan sumbu y di $(0,9)$.

b). Titik persekutuan kurva $y = 3^{x+2}$ dengan $y = 8^1$ adalah $(2,81)$.

6. $f(x) = 2^x$; $g(x) = 2^{x+5}$

x	-2	-1	0	1	2	3
$f(x)$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

x	-7	-6	-5	-4	-3	-2
$f(x)$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8



• Grafik g berbentuk sama dengan dengan grafik f tapi mengalami pergeseran sejauh 5 satuan ke arah kiri.

Uji Pemahaman Halaman 290

A. Pilihan Ganda

1. $y = {}^2 \log x = f(x)$

• $f(8) = {}^2 \log 8 = {}^2 \log 2^3 = 3$

• $f(4) = {}^2 \log 4 = {}^2 \log 2^2 = 2$

• $f(3) = {}^2 \log 3 \neq 1$

• $f(2) = {}^2 \log 2 = 1$

• $f(1) = {}^2 \log 1 = 0$

∴ Koordinat yang tidak berada di kurva = $(3, 1)$

Jawaban: C

2. Bentuk grafik menyerupai fungsi logaritma $y = {}^a \log (bx) + c$.

• Asimtot tegak $\equiv x = 0 \Rightarrow c = 0$

• $f(1) = 0 \Rightarrow 0 = {}^a \log b$

• $\Rightarrow b = 1$

∴ $y = {}^a \log x$

• $f(2) = 1 \Rightarrow 1 = {}^a \log 2$

$\Rightarrow a = 2$

∴ $y = {}^2 \log x$

Jawaban: A

3. titik potong dengan sumbu x ($y = 0$)

$\Rightarrow 0 = {}^x \log (x-4)$

$\Rightarrow x-4 = 1$

$\Rightarrow x = 5$

∴ Titik potong = $(5, 0)$

Jawaban: C

4. $y = {}^a \log (x+b)$

$f(2) = 0 \Rightarrow 0 = {}^a \log (b+2)$

$\Rightarrow b+2 = 1$

$\Rightarrow b = -1$

$\Rightarrow y = {}^a \log (x-1)$

$f(5) = 2 \Rightarrow 2 = {}^a \log (5-1)$

• $\Rightarrow 2 = {}^a \log 4$

$\Rightarrow a^2 = 4$

$\Rightarrow a = 2$

∴ $y = f(x) = {}^2 \log (x-1)$

• $f(3) = {}^2 \log (3-1) = {}^2 \log 2 = 1$

• $f(9) = {}^2 \log (9-1) = {}^2 \log 8 = 3$

• $f(17) = {}^2 \log (17-1) = {}^2 \log 16 = 4$

• $f(31) = {}^2 \log (31-1) = {}^2 \log 30 \neq 5$

• $f(65) = {}^2 \log (65-1) = {}^2 \log 64 = 6$

∴ Titik yang tidak ada pada grafik = $(31, 5)$

5. $f_1(x) = {}^2 \log (x+2)$

$f_2(x) = {}^3 \log (2x+1) - 2$

$f_3(x) = {}^2 \log (x+4) - 3$

$f_4(x) = {}^2 \log x - 2$

$f_5(x) = {}^2 \log (x-2)$

• $f_1(4) = {}^2 \log 6 \neq 0 \times$

• $f_2(4) = {}^3 \log (2 \cdot 4 + 1) - 2 = 0 \checkmark$

• $f_3(4) = {}^2 \log (4+4) - 3 = 0 \checkmark$

• $f_4(4) = {}^2 \log 4 - 2 = 0 \checkmark$

• $f_5(4) = {}^2 \log (4-2) = {}^2 \log 2 = 1 \times$

• $f_2(1) = {}^3 \log (2 \cdot 1 + 1) - 2 = 1 \neq -1 \times$

• $f_3(1) = {}^2 \log (1+4) - 3 \neq -1 \times$

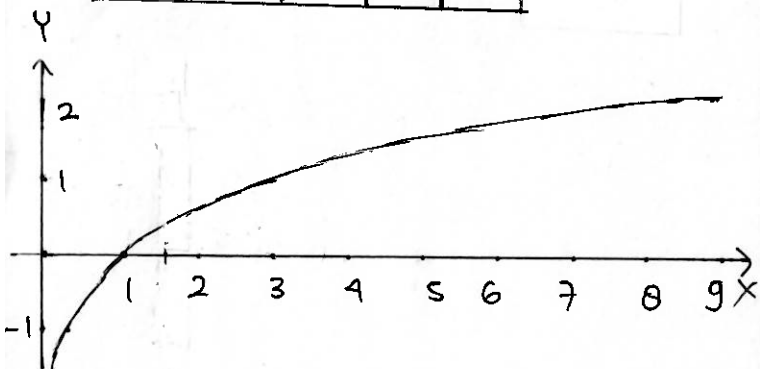
Jawaban: D.

Uji Pemahaman Halaman 290

B. Uraian

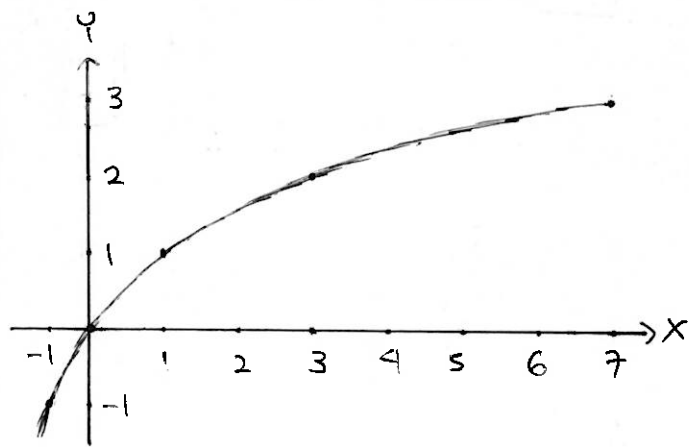
1. $y = {}^3 \log x$

x	$\frac{1}{3}$	1	3	9
y	-1	0	1	2



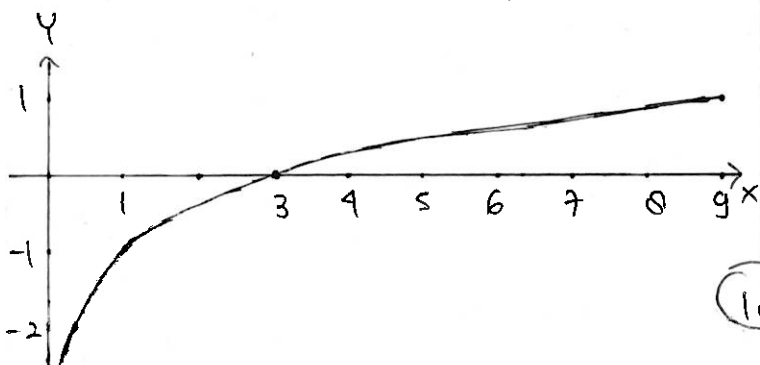
2. $y = {}^7 \log (x+1)$

x	$-\frac{1}{2}$	0	1	3	7
y	-1	0	1	2	3



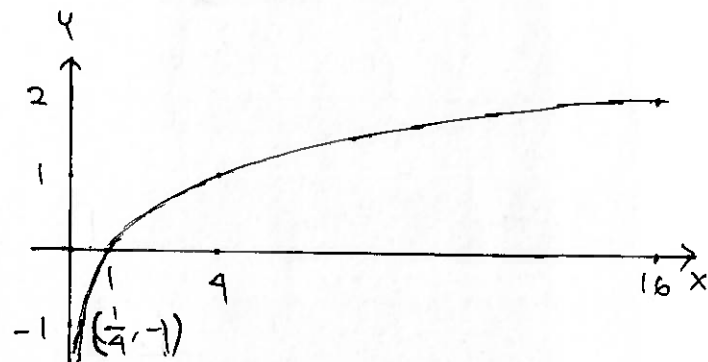
3. $y = {}^3 \log x - 1$

x	$\frac{1}{3}$	1	3	9
y	-2	-1	0	1



4. $y = {}^4 \log x$

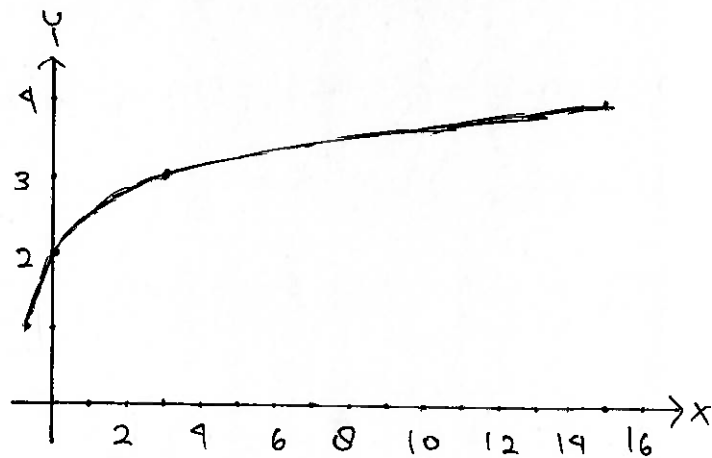
x	$\frac{1}{4}$	1	4	16
y	-1	0	1	2



5. $y - 2 = {}^4 \log (x+1)$

$\Leftrightarrow y = {}^4 \log (x+1) + 2$

x	$-\frac{3}{4}$	0	3	15
y	1	2	3	4



Uji Pemahaman Halaman 296

1. Misalkan Jumlah vitamin C dalam tubuh dengan waktu t

$$= k(t) = k(0) \cdot \left(\frac{1}{2}\right)^t$$

$$\circ k(0) = 400 \text{ mg}$$

$$\circ \text{Waktu paruh} = 2 \text{ jam} \Rightarrow t = \left(\frac{\text{waktu}}{2 \text{ jam}}\right)$$

$$\circ \text{Waktu awal} = 10.30 \text{ siang} = 10.30$$

$$\circ \text{Waktu pengamatan} = 08.30 \text{ malam}$$

$$= 20.30$$

$$\circ \text{Selisih waktu} = 20.30 - 10.30$$

$$= 10 \text{ jam}$$

\therefore Jumlah vitamin C pada pukul

$$20.30$$

$$= 400 \text{ mg} \cdot \left(\frac{1}{2}\right)^{\frac{10}{2}}$$

$$= 400 \cdot \left(\frac{1}{2}\right)^5$$

$$= 12,5 \text{ mg}$$

2. \circ Jumlah awal = $N_0 = 128$

$$\circ \text{Besarnya perkembangan} = 50\%$$

\circ Jumlah burung merak hijau setelah t tahun

$$= N_0 \cdot (100\% + 50\%)^t$$

$$= N_0 \cdot (1,5)^t$$

\therefore Jumlah burung merak pada tahun 2027

$$= 128 \cdot (1,5)^{2027-2022}$$

$$= 128 \cdot (1,5)^5$$

$$= 128 \cdot \left(\frac{3}{2}\right)^5$$

$$= 2^7 \cdot \frac{3^5}{2^5}$$

$$= 2^2 \cdot 3^5$$

$$= 972 \text{ ekor} //$$

$$3. B = B_0 \cdot 2^t$$

$$\circ \text{Waktu awal} = 08.55$$

$$\circ \text{waktu akhir} = 09.05$$

$$\Rightarrow t = 09.05 - 08.55$$

$$= 10 \text{ menit}$$

$$\circ B = 100 \cdot 2^{10}$$

$$= 102.400 \text{ bakteri.}$$

$$4. A(n) = 2 \times 3^{0,1n}$$

$$\circ \text{Luas daerah} = 3,1$$

$$\Rightarrow 3,1 = 2 \times 3^{0,1n}$$

$$\Rightarrow 1,55 = 3^{0,1n}$$

$$\Leftrightarrow 0,1 \cdot n = {}^3 \log 1,55$$

$$\Leftrightarrow n = \frac{{}^3 \log 1,55}{0,1}$$

$$= \frac{\log 1,55}{\log 3 \cdot 0,1}$$

$$\approx 3,989$$

$$\approx 4 \text{ minggu} //$$

5. Misalkan Faktor pertumbuhan = k .

\circ Jumlah penduduk pada tahun 2023

$$= 45.000$$

\circ Jumlah penduduk pada tahun 2013

$$= 50.000$$

\circ Jumlah penduduk setelah t (satuan 10 tahun)

$$= N(t) = N_0 \cdot k^t$$

$$\Rightarrow N(1) = 50.000 \cdot k^1$$

$$\Leftrightarrow 45.000 = 50.000 \cdot k$$

$$\Leftrightarrow k = \frac{45.000}{50.000} = \frac{9}{10}$$

\therefore Jumlah penduduk pada tahun 2033

$$= 50.000 \cdot \left(\frac{9}{10}\right)^{\frac{2033-2013}{10}}$$

$$= 50.000 (0,9)^2$$

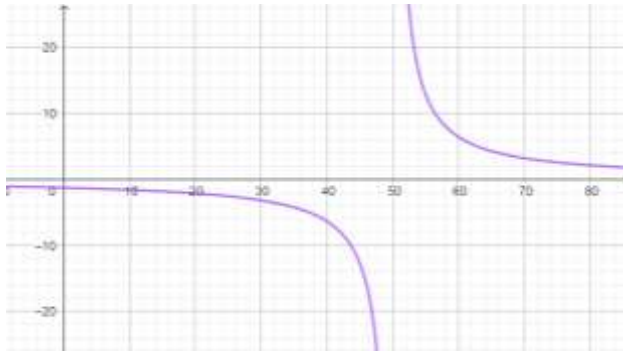
$$= 40.500 \text{ orang}$$

LATIHAN SOAL AKHIR BAB

1. C
2. D
3. E
4. C
5. D
6. E
7. D
8. B
9. E
10. E
11. D
12. E
13. D
14. B
15. B
16. E
17. A
18. C
19. A
20. C
21. C
22. D
23. B
24. D
25. D

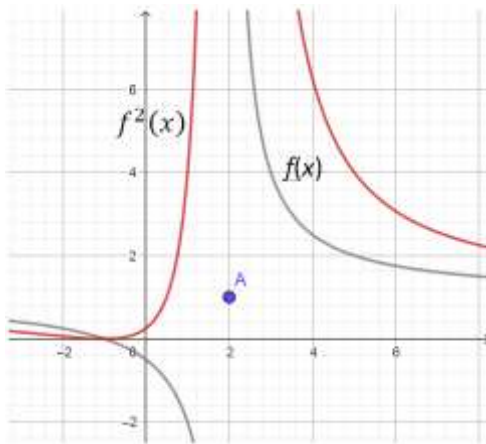
Esai

1. a) fungsi genap
b) bukan fungsi genap maupun fungsi ganjil
c) bukan fungsi genap maupun fungsi ganjil
2. a) ya
b) asimtot datar $:= y = 0$; asimtot tegak $:= x = 50$
c) Titik perpotongan dengan sumbu $Y := \left(0, -\frac{64}{50}\right)$ dan titik perpotongan dengan sumbu $X :=$ tidak ada.

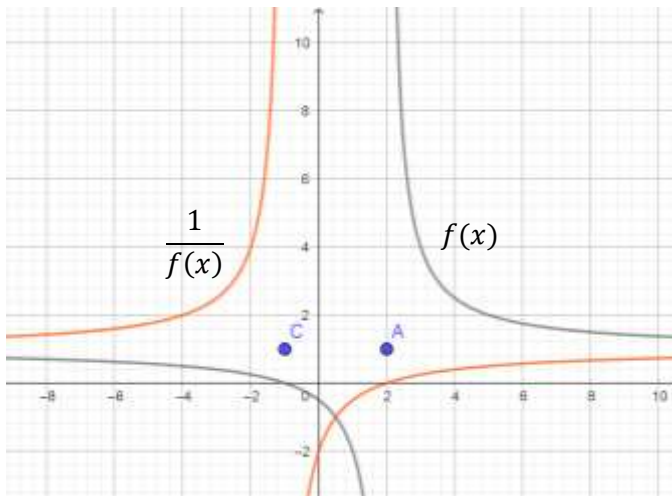


d)

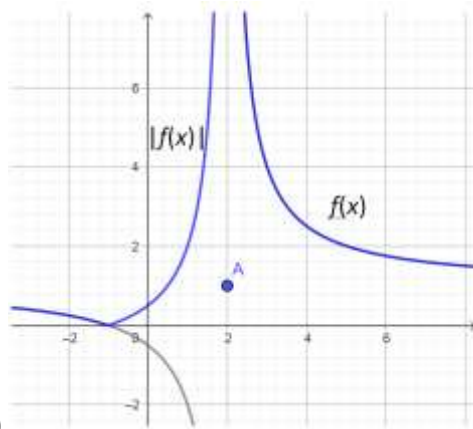
e) $\frac{32}{725}$



3. a)



b)



c)

d) Untuk bagian (a): makin dekat ordinat menuju 0 makin serupa bentuk fungsi satu sama lain kecuali untuk bagian fungsi f yang memiliki ordinat negatif. Untuk bagian (b): kedua fungsi memiliki asimtot datar yang sama. Untuk bagian (c): kedua fungsi memiliki bentuk yang sama, kecuali untuk bagian fungsi f yang memiliki ordinat negatif.

4. a) 30 ribu rupiah

b) $\frac{30}{90,54} \times 100\% = 33,14\%$

5. Rp3.855.433