

# **SOALAN RAMALAN**

## *MATEMATIK TAMBAHAN*

### *KERTAS 2*

**FUNGSI**  
*FUNCTION*



FUNGSI  
SABK S1



Diberi fungsi  $g(x) = x - 4$  dan  $fg(x) = \frac{3+x}{2+px-4p}, x \neq \frac{10}{3}$  di mana  $p$  ialah pemalar.

Given a function  $g(x) = x - 4$  and  $fg(x) = \frac{3+x}{2+px-4p}, x \neq \frac{10}{3}$  where  $p$  is a constant.

- (a) Cari fungsi  $f(x)$  dalam sebutan  $p$ .  
Find the function  $f(x)$  in terms of  $p$ .

[3 markah]

[3 marks]

- (b) Cari

Find

- (i) nilai  $p$ ,  
the value of  $p$ ,

- (ii) nilai  $q$  jika  $fg(q+3) = \frac{1}{2}g(6)$ .

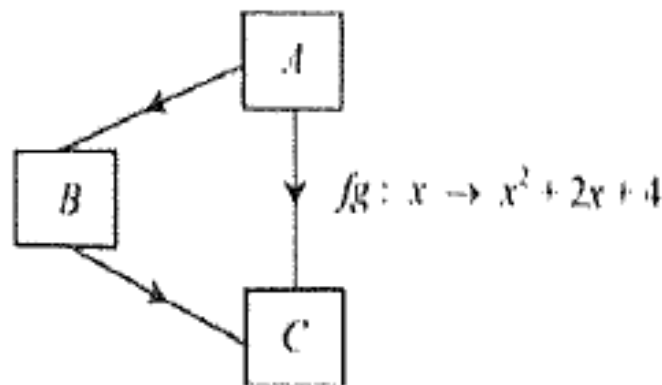
the value of  $q$  if  $fg(q+3) = \frac{1}{2}g(6)$ .

[5 markah]

[5 marks]

(a) Rajah 6 menunjukkan hubungan antara set  $A$ , set  $B$  dan set  $C$ .

Diagram 6 shows a relation between set  $A$ , set  $B$  and set  $C$ .



Rajah 6 / Diagram 6

Diberi bahawa set  $A$  dipetakan kepada set  $B$  oleh fungsi  $\frac{x+1}{2}$  dan dipetakan kepada set  $C$  oleh fungsi  $fg(x) = x^2 + 2x + 4$ .

Given that set  $A$  is mapped to set  $B$  by the function  $\frac{x+1}{2}$  and is mapped to set  $C$  by the function

$$fg(x) = x^2 + 2x + 4.$$

(i) Tulis fungsi yang memetakan set  $A$  kepada set  $B$  dengan menggunakan tatanda fungsi.

Write the function that maps set  $A$  to set  $B$  using function notation.

(ii) Cari fungsi yang memetakan set  $B$  kepada set  $C$ .

Find the function that maps set  $B$  to set  $C$ .

[4 markah]

[4 marks]

(b) Diberi  $f(x) = \frac{x}{x-p}$ ,  $x \neq p$  dan suatu fungsi  $g$  dengan keadaan  $g^{-1}g(p-3) = f(p-4)$ .

Cari nilai bagi  $p$ .

Given  $f(x) = \frac{x}{x-p}$ ,  $x \neq p$  and a function  $g$  such that  $g^{-1}g(p-3) = f(p-4)$ .

Find the value of  $p$ .

[3 markah]

[3 marks]

**FUNGSI**  
**SABK TRIAL**



Diberi fungsi  $h(x) = \frac{3+2x}{5}$  dan  $k(x) = \frac{5x-3}{2}$ .

Given function  $h(x) = \frac{3+2x}{5}$  and  $k(x) = \frac{5x-3}{2}$ .

(a) Cari  $hk(x)$  dan  $kh(x)$ .

Find  $hk(x)$  and  $kh(x)$ .

[4 markah]

[4 marks]

(b) Seterusnya, sahkan kebenaran bahawa fungsi  $h(x) = \frac{3+2x}{5}$  mempunyai fungsi

songsang,  $k(x) = \frac{5x-3}{2}$ .

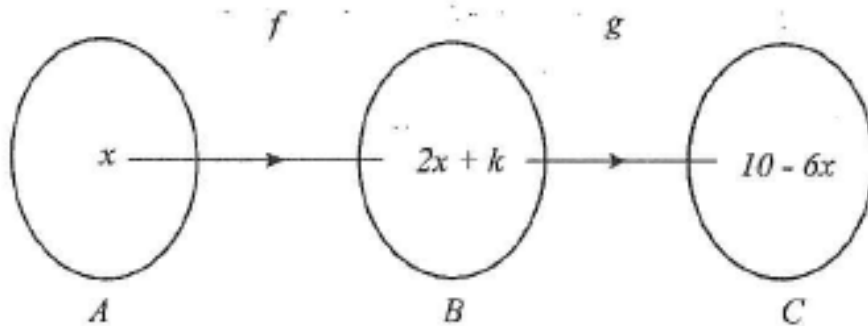
[2 markah]

Hence, verified if the function  $h(x) = \frac{3+2x}{5}$  has an inverse function,  $k(x) = \frac{5x-3}{2}$ .

[2 marks]

Dalam Rajah 1, fungsi  $f(x) = 2x + k$  memetakan set  $A$  kepada set  $B$  dan fungsi  $g(x) = 1 - 3x$  memetakan set  $B$  kepada set  $C$ .

In Diagram 1, the function  $f(x) = 2x + k$  maps set  $A$  to set  $B$  and the function  $g(x) = 1 - 3x$  maps set  $B$  to set  $C$ .



Rajah 1

Diagram 1

(a) Cari nilai,

Find the value of,

(i)  $k$ ,

(ii)  $p$  jika  $fg^{-1}\left(\frac{p}{2}\right) = 3$ .

$p$  if  $fg^{-1}\left(\frac{p}{2}\right) = 3$ .

[5 markah]

[5 marks]

(b) Lakar graf  $y = |g(x)|$  untuk  $-2 \leq x \leq 5$ .

[2 markah]

Sketch the graph of  $y = |g(x)|$  for  $-2 \leq x \leq 5$ .

[2 marks]

FUNGSI

Diberi fungsi  $f : x \rightarrow \frac{x}{4} - 3$  dan  $gf : x \rightarrow \frac{x}{2} - 7$ , cari

Given the function  $f : x \rightarrow \frac{x}{4} - 3$  and  $gf : x \rightarrow \frac{x}{2} - 7$ , find

(a)  $f^{-1}(x)$ ,

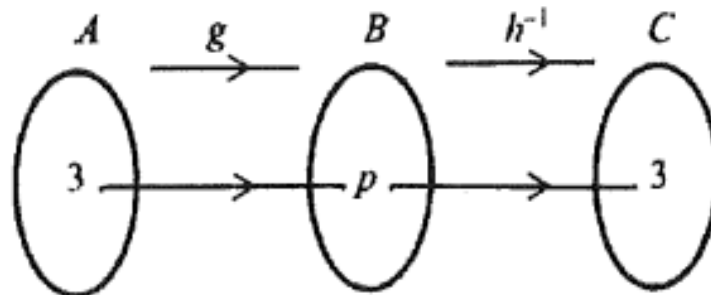
(b)  $g(x)$ ,

(c)  $gf^{-1}(2)$ .

FUNGSI

Rajah 1 menunjukkan fungsi  $g$  memetakan set  $A$  ke set  $B$  dan fungsi  $h^{-1}$  memetakan set  $B$  kepada set  $C$ .

Diagram 1 shows function  $g$  maps set  $A$  to set  $B$  and function  $h^{-1}$  maps set  $B$  to set  $C$ .



Rajah 1

Diagram 1

Diberi bahawa  $g(x) = 3x - 1$  dan  $h^{-1}g(x) = \frac{3+6x}{3x-2}$ ,  $x \neq \frac{2}{3}$ .

Given that  $g(x) = 3x - 1$  and  $h^{-1}g(x) = \frac{3+6x}{3x-2}$ ,  $x \neq \frac{2}{3}$ .

(a) Jika seorang murid menulis  $p = 10$ , tentukan sama ada nilai itu betul atau salah.

Berikan sebab anda. [2 markah]

If a student writes  $p = 10$ , determine whether the value is correct or wrong.

Give your reason. [2 marks]

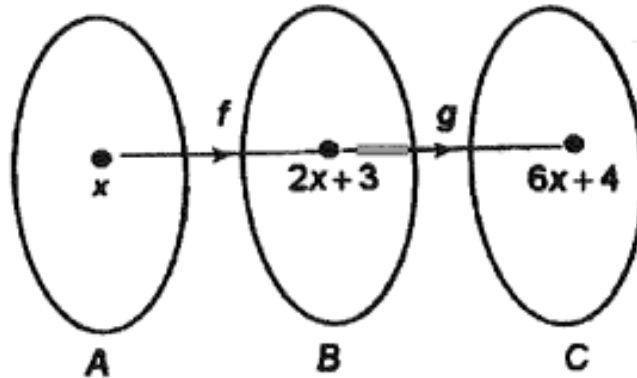
(b) Cari  $h^{-1}(x)$ . [3 markah]

Find  $h^{-1}(x)$ . [3 marks]

## FUNGSI

Dalam Rajah 7, fungsi  $f$  memetakan set  $A$  kepada set  $B$  dan fungsi  $g$  memetakan set  $B$  kepada set  $C$ .

In Diagram 7, the function  $f$  maps set  $A$  to set  $B$  and the function  $g$  maps set  $B$  to set  $C$ .



Rajah 7 / Diagram 7

- (a) Cari dalam sebutan  $x$ , fungsi  
Find in terms of  $x$ , function
- yang memetakan set  $B$  kepada set  $A$ ,  
that maps set  $B$  to set  $A$ ,
  - $g(x)$ ,
  - $gf^{-1}(x)$ .
- [5 markah/ marks]
- (b) Seterusnya, lakarkan graf  $y = |g(x)|$  untuk  $-2 \leq x \leq 3$ . Nyatakan julat bagi  $y$ .  
Hence, sketch the graph of  $y = |g(x)|$  for  $-2 \leq x \leq 3$ . State the range of  $y$ .

## FUNGSI

- (a) Satu fungsi  $f$  ditakrifkan sebagai  
A function  $f$  is defined by

$$f(x) = \begin{cases} 3-x, & x < 3 \\ x-3, & x \geq 3 \end{cases}$$

- (i) Hitung nilai bagi  $f(5)$ .  
Calculate the value of  $f(5)$ .
- (ii) Cari nilai bagi  $x$  jika  $f(a) = a$  apabila  $x < 3$ .  
Find the value of  $x$  if  $f(a) = a$  when  $x < 3$ .

[3 markah/marks]

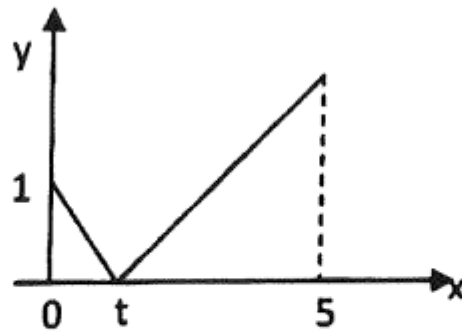
- (b) Diberi fungsi  $g(x) = 3x - 2$ .  
Given function  $g(x) = 3x - 2$ .

- (i) Cari fungsi  $h(x)$ , diberi bahawa  $hg(x) = 3x + 2$ .  
Find function  $h(x)$ , given that  $hg(x) = 3x + 2$ .
- (ii) Cari fungsi  $k(x)$ , diberi bahawa  $gk(x) = 3x + 2$ .  
Find function  $k(x)$ , given that  $gk(x) = 3x + 2$ .

[5 markah/marks]

# FUNGSI

- (a) Rajah 2 menunjukkan graf bagi fungsi  $f(x) = |1 - 3x|$  bagi domain  $0 \leq x \leq 5$ .  
*Diagram 2 shows the graph of function  $f(x) = |1 - 3x|$  for the domain  $0 \leq x \leq 5$ .*



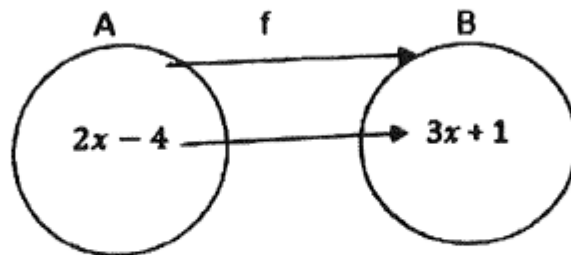
Rajah 2/ Diagram 2

Nyatakan  
*State*

- i) nilai  $t$   
*the value of  $t$*
- ii) julat  $f(x)$  yang sepadan dengan domain yang diberi  
*the range of  $f(x)$  corresponding to the given domain.*

[2 markah/ 2 marks]

- (b) Rajah 3 menunjukkan fungsi  $f$  yang memetakan set A kepada set B.  
*Diagram 3 shows function  $f$  that maps set A to set B*



Rajah 3/ Diagram 3

Cari fungsi  $f(x)$ .  
*Find function  $f(x)$ .*

[3 markah/ 3 marks]

## FUNGSI

Diberi  $g(x) = \frac{ax + b}{cx + d}$ ,  $x \neq k$ .

Given  $g(x) = \frac{ax + b}{cx + d}$ ,  $x \neq k$ .

(a) Ungkapkan  $k$  dalam sebutan  $c$  dan  $d$ . Seterusnya, cari  $g^{-1}(x)$ .

*Express  $k$  in terms of  $c$  and  $d$ . Hence, find  $g^{-1}(x)$ .*

[3 markah]

[3 marks]

(b) Dengan menggunakan fungsi  $g^{-1}(x)$  yang diperoleh, tentukan  $g^{-1}(x)$  bagi setiap fungsi berikut:

*Using function  $g^{-1}(x)$  obtained, determine  $g^{-1}(x)$  for each of the following functions:*

(i)  $g(x) = \frac{7x - 4}{2x - 3}$ ,  $x \neq \frac{3}{2}$

(ii)  $g(x) = \frac{2x - 3}{x - 5}$ ,  $x \neq 5$

[2 markah]

[2 marks]

(c) Jika  $c \neq 0$ , apakah syarat ke atas  $a$  dan  $d$  supaya  $g = g^{-1}$ ?

*If  $c \neq 0$ , what is the condition on  $a$  and  $d$  so that  $g = g^{-1}$ ?*

[1 markah]

[1 mark]

# FUNGSI

Diagram 2 shows the relation of three sets.

Rajah 2 menunjukkan hubungan bagi tiga set.

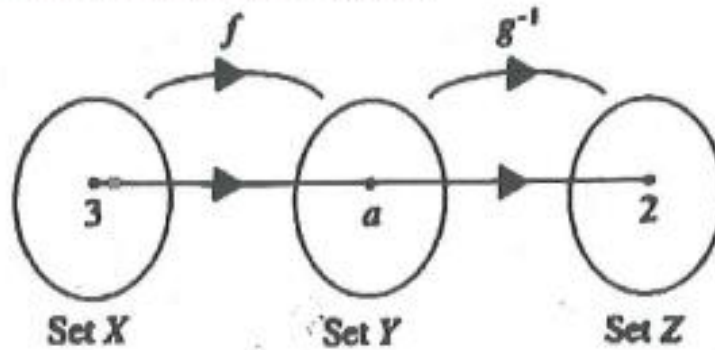


Diagram 2

Rajah 2

It is given that  $f: x \rightarrow 2x + 3$  and  $g^{-1}f: x \rightarrow \frac{3}{x} + 1, x \neq 0$ .

Diberi bahawa  $f: x \rightarrow 2x + 3$  dan  $g^{-1}f: x \rightarrow \frac{3}{x} + 1, x \neq 0$ .

(a) If a student writes  $a = 10$ , determine whether the value is correct or wrong.

Give your reason.

Jika seorang murid menulis  $a = 10$ , tentukan sama ada nilai ini betul atau salah.

Beri sebab anda.

(b) Find  $g^{-1}(x)$ .

Cari  $g^{-1}(x)$ .

[4 marks]

[4 markah]

# FUNGSI

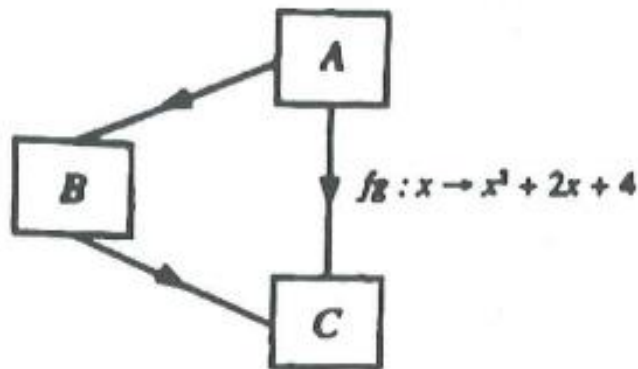


Diagram 9  
Rajah 9

It is given that set A maps to set B by the function  $\frac{x+1}{2}$  and maps to set C by  $fg : x \rightarrow x^2 + 2x + 4$ .

Diberi bahawa set A dipetakan kepada set B oleh fungsi  $\frac{x+1}{2}$  dan dipetakan kepada set C oleh  $fg : x \rightarrow x^2 + 2x + 4$ .

- (a) Write the function which maps set A to set B by using the function notation.  
Tulis fungsi yang memetakan set A kepada set B dengan menggunakan tatatanda fungsi.
- (b) Find the function which maps set B to set C.  
Cari fungsi yang memetakan set B kepada set C.

[4 marks]

[4 marks]

## FUNGSI

Diberi  $g(x) = \frac{2x-5}{3x-p}$ ,  $x \neq q$ .

Given  $g(x) = \frac{2x-5}{3x-p}$ ,  $x \neq q$ .

(a) (i) Ungkapkan  $p$  dalam sebutan  $q$  dan cari  $g^{-1}(x)$  dalam sebutan  $p$ .  
*Express  $p$  in terms of  $q$  and find  $g^{-1}(x)$  in term of  $p$ .*

(ii) Diberi  $g^{n-1}(x) = \frac{px-5}{3x-2}$ ,  $x \neq k$ , tentukan nilai  $n$  dengan membandingkan  $g^{-1}(x)$  di atas dengan  $g^{n-1}(x)$  yang diberikan.  
Seterusnya, cari nilai  $k$ .

*Given  $g^{n-1}(x) = \frac{px-5}{3x-2}$ ,  $x \neq k$ , determine the value of  $n$  by comparing the  $g^{-1}(x)$  above with the given  $g^{n-1}(x)$ .*

*Next, find the value of  $k$ .*

[5 markah]

[5 marks]

b) Apakah syarat ke atas  $p$  supaya  $g = g^{-1}$ ?

*What is the condition on  $p$  so that  $g = g^{-1}$ ?*

[1 markah]

[1 mark]



SABK S1

$$f(x) = \frac{3 + (x + 4)}{2 + p(x + 4) - 4p} = \frac{7+x}{2+px}$$

$$2 + px - 4p = 0$$

$$-\frac{2}{p} + 4 = \frac{10}{3}$$

$$p = 3$$

$$\frac{3+(q+3)}{3(q+3)-10} = \frac{1}{2} (6 - 4)$$

$$q = \frac{7}{2}$$

SABK S2

$$g: x \rightarrow \frac{x+1}{2}$$

$$g^{-1}(x) = 2x - 1$$

$$fgg^{-1}(x) = (2x-1)^2 + 2(2x-1) + 4 = 4x^2 + 3$$

$$g^{-1}g(p-3) = f(p-4)$$

$$p-3 = \frac{p-4}{p-4-p}$$

$$-4p + 12 = p - 4$$

$$p = \frac{16}{5}$$

SABK TRIAL

$$hk(x) = \frac{3 + 2\left(\frac{5x-3}{2}\right)}{5} = \frac{3+5x-3}{5} = x$$

$$kh(x) = \frac{5\left(\frac{3+2x}{2}\right) - 3}{2} = \frac{3+2x-3}{2} = x$$

Oleh sebab  $hk(x) = kh(x) = x$ , maka  $k(x) = \frac{5x-3}{2}$

ialah fungsi songsang bagi  $h(x) = \frac{3+2x}{5}$

SABK S1

$$g[f(x)] = 10 - 6x$$

$$1 - 3(2x+k) = 10 - 6x$$

$$1 - 6x - 3k = 10 - 6x$$

$$1 - 3k - 6x = 10 - 6x$$

$$1 - 3k = 10$$

$$-3k = 9$$

$$k = -3$$

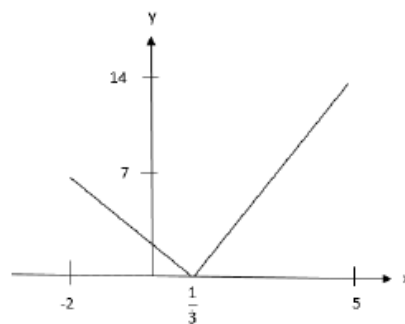
$$g^{-1}(x) = \frac{1-x}{3}$$

$$g^{-1}\left(\frac{p}{2}\right) = \frac{1-\frac{p}{2}}{3} = \frac{2-p}{6}$$

$$fg^{-1}\left(\frac{p}{2}\right) = 2\left(\frac{2-p}{6}\right) + 3 = 3$$

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

$$p = -16$$



**FUNGSI TRIGONOMETRI**  
YIK



**SABK S1**

2(a)  $f^{-1}(x) = 4x + 12$  NI  $f(x) = \frac{x}{4} - 3$   
 $y = \frac{x}{4} - 3 \Rightarrow 4(y+3) = x$   
 $4(y+3) = x$   
 $y+3 = \frac{x}{4}$   
 $4(y+3) = x$

(b)  $g(x) = \frac{x+2}{2} - 7$   
 $g(x) = 2x - 1$   
 Luor  $\leftarrow g f(x) = \frac{x}{2} - 7$   
 $y_{\text{inverse}} \text{ dlm } 4y + 12 = x$

(c)  $f^{-1}(2) = 20$  OR  $g^{-1}(x) = 8x + 23$   
 $39 \checkmark$  NI  $2(4x+12) - 1$  NI  
 $= 8x + 24 - 1$   
 $= 8x + 23$

**SABK S2**

1(a)  $3(3) - 1$   
 salah.  $p = 8$

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

$h^{-1} = \frac{3+6\left(\frac{y+1}{3}\right)}{3\left(\frac{y+1}{3}\right)-2}$

$h^{-1} = \frac{5+2x}{x-1}, x \neq 1$

**SABK TRIAL**

(b) (i)  $1 - 2p^2$   
 (ii) identify  $\sqrt{1-p^2}$   
 $\frac{\sqrt{1-p^2}}{p}$

Section B  
 (a) (i)  $f(x) = 2x+3$   
 Let  $y = 2x+3$   
 $x = \frac{y-3}{2}$   
 $f^{-1}(y) = \frac{y-3}{2}$   
 $f^{-1}(x) = \frac{x-3}{2}$

(ii)  $g(x) = 6x+4$   
 $g(2x+3) = 6x+4$   
 Let  $y = 2x+3$   
 $x = \frac{y-3}{2}$   
 $g(y) = 6\left(\frac{y-3}{2}\right) + 4$   
 $= 3y - 5$   
 $g(x) = 3x - 5$

(b)

x	-2	0	3	$\frac{5}{3}$
y	11	5	4	0

**MIMS S2**

$5-3$   
 $2$

$a = 3 - a$   
 $a = \frac{3}{2}$

$h(3x-2) = 3x+2$   
 $x = \frac{y+2}{3}$   
 $h(y) = 3\left(\frac{y+2}{3}\right) + 2$   
 $h(x) = x+4$

$3[k(x)] - 2 = 3x+2$   
 $k(x) = \frac{3x+4}{3}$

FUNGSI TRIGONOMETRI  
YIK



FUNGSI

i)  $\frac{1}{3}$

ii)  $0 \leq f(x) \leq 14$

$f(2x - 4) = 3x + 1$  or  $y = 2x - 4, x = \frac{y+4}{2}$

$f(y) = 3\left(\frac{y+4}{2}\right) + 1$

$f(x) = \frac{3x+14}{2}$

FUNGSI

$f(x) = 2x + 3$

$f(3) = 2(3) + 3 = 9$

$f(3) = a = 9$

The value of  $a = 10$  is wrong

(b)  $g^{-1}f(x) = \frac{3}{x} + 1$

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

Let  $2x + 3 = u$

$2x = u - 3$

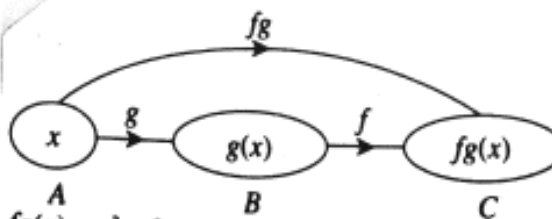
$x = \frac{u - 3}{2}$

$g^{-1}(u) = \frac{\frac{3}{\frac{u-3}{2}} + 1}{2}$

$= \frac{6}{u-3} + 1$

$g^{-1}(x) = \frac{6}{x-3} + 1, x \neq 3$

FUNGSI



$fg(x) = x^2 + 2x + 4$

(a)  $g: x \rightarrow \frac{x+1}{2}$

(b)  $g(x) = \frac{x+1}{2}; fg(x) = x^2 + 2x + 4$

Let  $\frac{x+1}{2} = y$

$x = 2y - 1$

$fg(x) = x^2 + 2x + 4$

$f(y) = (2y - 1)^2 + 2(2y - 1) + 4$

$f(y) = 4y^2 - 4y + 1 + 4y - 2 + 4$

$f(y) = 4y^2 + 3$

$f(x) = 4x^2 + 3$

$\therefore f(x) = 4x^2 + 3$

FUNGSI

(a) (i)

$3q - p = 0$

$p = 3q$

Let  $g^{-1}(x) = y$

$g(y) = x$

$\frac{2y-5}{3y-p} = x$

$2y - 5 = 3xy - px$

$y = \frac{5 - px}{2 - 3x}$

$g^{-1}(x) = \frac{px - 5}{3x - 2}, x \neq \frac{2}{3}$

(ii)  $n = 0$

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

(b)  $g(x) = g^{-1}(x)$  jika  $p = 2$