

①

Operasi Fungsi

Operasi : + , x , : , -

$$f = 2x - 4$$

$$g = x + 1$$

$$f + g = (2x - 4) + (x + 1) = 3x - 3$$

$$f - g = (2x - 4) - (x + 1) = x - 5$$

$$f \cdot g = (2x - 4) \cdot (x + 1) = 2x^2 - 2x - 4$$

$$\frac{f}{g} = \frac{2x - 4}{x + 1}$$

1) $f = 3x^2 - 3$ $g(x) = x + 1$
 $f + g$, $f - g$, $f \cdot g$, f/g

2) $f = 4x + 3$ $g = 2x - 2$
 $f + g$, $f - g$, $f \cdot g$, f/g .

②

Fungsi Invers

$$y = x + 5$$

$$x = y - 5$$

$$\Downarrow \quad \Downarrow$$
$$\textcircled{y^{-1}} = x - 5$$

fungsi invers dari y

$$\boxed{y = 3x - 7}$$

$$3x = y + 7$$

$$x = \frac{y + 7}{3}$$

$$\boxed{y^{-1} = \frac{x + 7}{3}}$$

Latihan :

tentukan fungsi invers dari

$$y = 5x + 3$$

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Fungsi kuadrat

$$y = x^2 - 6$$

$$x^2 = y + 6$$

$$x = \pm \sqrt{y+6}$$

$$y^{-1} = \pm \sqrt{x+6}$$

$$\underline{\underline{x \geq -6}}$$

Latihan:

Tentukan fungsi
invers dari

a) $y = 2x^2 - 1$

b) $y = 3x^2 + 4$

fungsi pecahan

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

$$1-y = \frac{x-1}{3x+2}$$

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

$$3x - 3xy - 2y + 2 = x - 1$$

$$2x - 3xy = 2y - 3$$

$$x(2-3y) = 2y-3$$

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

$$\boxed{y^{-1} = \frac{2x-3}{2-3x}}$$

Latihan

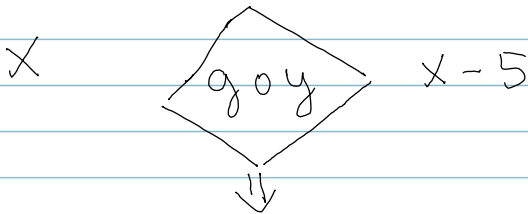
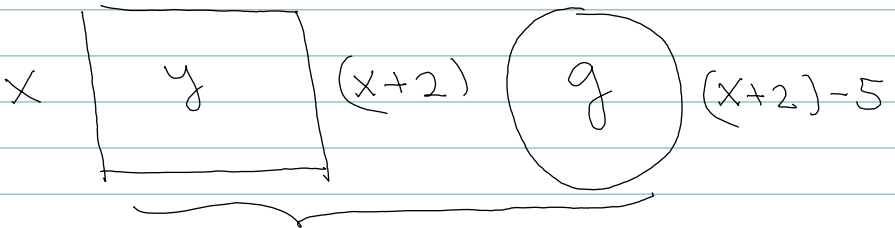
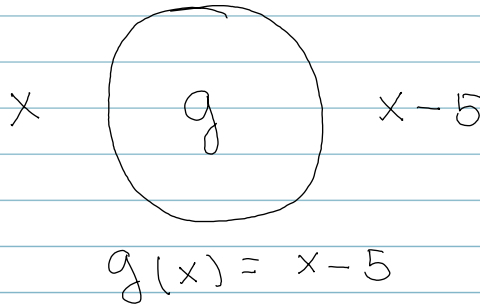
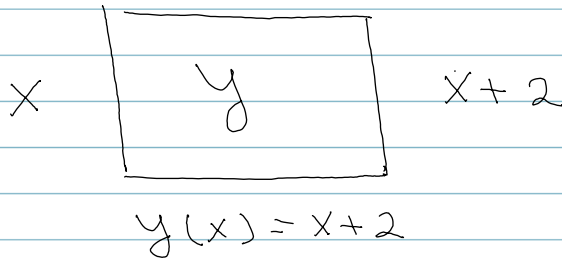
Tentukan fungsi invers
dari

a) $y = 2 - \frac{x+1}{5x-1}$

b) $y = \frac{x-7}{2x-3}$

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Fungsi komposisi



$g(y) =$ fungsi komposisi

Contoh 1

$$f(x) = x^2 - 5 \Leftarrow$$

$$g(x) = 2 - x \Rightarrow$$

$$g \circ f = g(f)$$

$$= g(x^2 - 5)$$

$$= 2 - (x^2 - 5)$$

$$= 7 - x^2$$

$$f \circ g = f(g)$$

$$= f(2 - x)$$

$$= (2 - x)^2 - 5$$

berapa

$f \circ g$ dan $g \circ f$

$$f(x) = 3x - 7$$

$$g(x) = 5x^2 - 3$$

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Contoh 2

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

$$g(x) = x - 1$$

$$\begin{aligned} a) f \circ g &= f(g) \\ &= f(x-1) \\ &= (x-1)^2 \end{aligned}$$

$$\begin{aligned} b) g \circ f &= g(f) \\ &= g(x^2) \\ &= x^2 - 1 \end{aligned}$$

$$f \circ g \neq g \circ f$$

$$\begin{aligned} c) f \circ f &= f(f) \\ &= f(x^2) \\ &= (x^2)^2 \\ &= x^4 \end{aligned}$$

$$\begin{aligned} d) g \circ g &= g(g) \\ &= g(x-1) \\ &= (x-1) - 1 \\ &= \underline{\underline{x-2}} \end{aligned}$$

Contoh 3

$$f(x) = \sqrt{1-x^2}$$

$$g(x) = 2x^2$$

$$\begin{aligned} a) f \circ g &= f(g) \\ &= f(2x^2) \\ &= \sqrt{1 - (2x^2)^2} \\ &= \sqrt{1 - 4x^4} \end{aligned}$$

$$\begin{aligned} D_{f \circ g} &= \{x \in \mathbb{R} : -1 \leq 2x^2 \leq 1\} \\ &= \{x \in \mathbb{R} : 0 \leq x^2 \leq \frac{1}{2}\} \\ &= \{x \in \mathbb{R} : \underline{\underline{-\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}}}\} \end{aligned}$$

$$\begin{aligned} b) g \circ f &= g(f) \\ &= g(\sqrt{1-x^2}) \\ &= 2(\sqrt{1-x^2})^2 \\ &= 2(1-x^2) \end{aligned}$$

$$\begin{aligned} f(x) &= \sqrt{1-x^2} \\ &-1 \leq x \leq 1 \end{aligned}$$

$$D_{g \circ f} = \{x \in \mathbb{R} : -1 \leq x \leq 1\}$$

7)

Latihan

1) jika

$$f(x) = 3x + 7$$

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

tentukan

$$\underline{f+g}, \quad \underline{f-g}, \quad \underline{f \circ g}, \quad \underline{\frac{f}{g}}$$

2) Tentukan fungsi invers dari

a) $f(x) = x + 5$

b) $f(x) = x^2 + 5$

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

3) jika $f(x) = x^2$
 $g(x) = x - 1$

tentukan

a) $(f \circ g) \checkmark$

b) $g \circ f \checkmark$

c) $f \circ f \checkmark$

d) $g \circ g \checkmark$

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Invers dan Komposisi

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

$$g(x) = 2x+5$$

$$(g \circ f)^{-1}$$

Cara 1 :

$$\begin{aligned} g \circ f &= g(f) = g\left(\frac{1}{2}(x+1)\right) \\ &= 2\left[\frac{1}{2}(x+1)\right] + 5 = x+6 \end{aligned}$$

$$g \circ f = x+6$$

$$x = y-6 \Rightarrow \underline{\underline{(g \circ f)^{-1} = x-6}}$$

Cara 2 :

$$f(x) = \frac{1}{2}(x+1) \rightarrow y = \frac{1}{2}(x+1)$$

$$2y = x+1 \rightarrow x = 2y-1$$

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

$$g(x) = 2x+5 \rightarrow y = 2x+5$$

$$y-5 = 2x \rightarrow x = \frac{y-5}{2}$$

$$g^{-1}(x) = \frac{x-5}{2}$$

$$(g \circ f)^{-1} = f^{-1} \circ g^{-1} = f^{-1}(g^{-1})$$

$$= f^{-1}\left(\frac{x-5}{2}\right) = 2\left(\frac{x-5}{2}\right) - 1 = \underline{\underline{x-6}}$$

$$\boxed{(g \circ f)^{-1} = f^{-1} \circ g^{-1}} \quad !!$$

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Tiga fungsi:

$$f(x) = x - 1 \quad g(x) = 5 - x \quad h(x) = 2x$$

a) $(f \circ g \circ h)(x)$

b) $(h \circ g \circ f)(x)$

a) $h(x) = 2x$

$$g(h) = 5 - h = 5 - 2x$$

$$f(g) = g - 1 = (5 - 2x) - 1 = 4 - 2x$$

$$f \circ g \circ h(x) = f \circ g(h) = f(g(h)) = \underline{\underline{4 - 2x}}$$

b) $f(x) = x - 1$

$$g(f) = 5 - f = 5 - (x - 1) = 6 - x$$

$$h(g) = 2g = 2(6 - x) = 12 - 2x$$

$$h \circ g \circ f(x) = \underline{\underline{12 - 2x}}$$

Latihan

$$f(x) = 2x + 3 \quad g(x) = 5 - 7x \quad h(x) = 3x - 1$$

a) $f \circ g \circ h$

b) $h \circ g \circ f$