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SMAN 1 Bone-Bone, Luwu Utara, Sul-Sel

Kebahagiaan akan tumbuh berkembang manakala Anda membantu orang lain. Namun bilamana Anda tidak mencoba membantu sesama, kebahagiaan akan layu dan mengering. Kebahagiaan bagaikan sebuah tanaman, harus disirami tiap hari dengan sikap dan tindakan memberi (J. Donald Walters)

[RUMUS CEPAT MATEMATIKA]

Program Linear

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Materi ini dapat disebarluaskan secara bebas, untuk tujuan bukan komersial, dengan atau tanpa menyertakan sumber. Hak Cipta selamanya pada Allah Swt. Salam hangat selalu ...
Muhammad Zainal Abidin | admin of <http://meetabied.wordpress.com>

1. Jika $f(x) = \frac{1}{x}$ dan $g(x) = 2x - 1$, maka $(f \circ g)^{-1}(x)$ adalah....

A. $\frac{2x-1}{x}$

B. $\frac{x}{2x-1}$

C. $\frac{x+1}{2x}$

D. $\frac{2x+1}{2x}$

E. $\frac{2x-1}{2x}$

Smart

Info :

π

π $f(x) = \frac{ax+b}{cx+d}$, maka

$$f^{-1}(x) = \frac{-dx+b}{cx-a}$$

$\Rightarrow f(x) = \frac{1}{x}$ dan $g(x) = 2x-1$

$$(f \circ g)(x) = \frac{1}{2x-1} = \frac{0 \cdot x + 1}{2x-1}$$

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

2. Jika $(g \text{ of } f)(x) = 4x^2 + 4x$, dan $g(x) = x^2 - 1$, maka $f(x - 2)$ adalah...
- A. $2x + 1$
 - B. $2x - 1$
 - C. $2x - 3$
 - D. $2x + 3$
 - E. $2x - 5$

Smart

Info :

π

π $f(x) = ax + b$ maka :

$$f(x - k) = a(x - k) + b$$

π sebaliknya :

$f(x - k) = ax + b$, maka :

$$f(x) = a(x + k) + b$$

$$\nabla (g \text{ of } f)(x) = 4x^2 + 4x, \quad g(x) = x^2 - 1$$

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

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

$$f^2(x) = 4x^2 + 4x + 1 = (2x + 1)^2$$

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

$$\nabla f(x - 2) = 2(x - 2) + 1 \\ = 2x - 3$$

3. Jika $f(x) = \sqrt{x+1}$ dan $g(x) = x^2 - 1$, maka $(g \circ f)(x)$ adalah....
- A. x
 - B. $x - 1$
 - C. $x + 1$
 - D. $2x - 1$
 - E. $x^2 + 1$

Smart

Info :

π

π $\sqrt{a^2} = a$, tapi :

$$(\sqrt{a^2})^2 = a^2$$

$$\text{jadi : } (\sqrt{f(x)})^2 = f(x)$$

π

$$\text{✎ } f(x) = \sqrt{x+1} \quad , \quad g(x) = x^2 - 1$$

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

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

$$= x + 1 - 1$$

$$= x$$

4. Jika $f(x) = \frac{1}{2x-1}$ dan $(f \circ g)(x) = \frac{x}{3x-2}$, maka $g(x)$ sama dengan....

A. $2 + \frac{1}{x}$

B. $1 + \frac{2}{x}$

C. $2 - \frac{1}{x}$

D. $1 - \frac{2}{x}$

E. $2 - \frac{1}{2x}$



Solusi

Info :

π

$$\text{✎ } (f \circ g) = \frac{x}{3x-2},$$

$$\text{✎ } f = \frac{1}{2x-1}$$

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

$$\frac{1}{2g-1} = \frac{x}{3x-2} \rightarrow 2g-1 = \frac{3x-2}{x}$$

$$g = \frac{3x-2}{2x} + \frac{1}{2} = \frac{6x+4+2x}{4x} = \frac{8x+4}{4x} = 2 + \frac{1}{x}$$

5. Fungsi $f : \mathbb{R} \rightarrow \mathbb{R}$ dan $g : \mathbb{R} \rightarrow \mathbb{R}$ ditentukan oleh $f(x) = 2x - 1$ dan $g(x) = x^2 + 6x + 9$, maka $(g \circ f)(x)$ adalah....
- A. $2x^2 + 12x + 17$
 - B. $2x^2 + 12x + 8$
 - C. $4x^2 + 12x + 4$
 - D. $4x^2 + 8x + 4$
 - E. $4x^2 - 8x - 4$

Solusi

Info :

$$\pi$$
$$\pi \quad (g \circ f)(x) = g(f(x))$$

$$\begin{aligned} \text{✎ } f(x) &= 2x - 1, & g(x) &= x^2 + 6x + 9 \\ (g \circ f)(x) &= g(f(x)) \\ &= (2x - 1)^2 + 6(2x - 1) + 9 \\ &= 4x^2 - 4x + 1 + 12x - 6 + 9 \\ &= 4x^2 + 8x + 4 \end{aligned}$$

6. Jika $f(x) = \sqrt{x^2 + 1}$ dan

$$(f \circ g)(x) = \frac{1}{x-2} \sqrt{x^2 - 4x + 5}, \text{ maka } g(x-3) = \dots$$

A. $\frac{1}{x-5}$

B. $\frac{1}{x+1}$

C. $\frac{1}{x-1}$

D. $\frac{1}{x-3}$

E. $\frac{1}{x+3}$

Solusi

Info :

$$\pi \quad f \circ g(x) = \frac{1}{x-2} \sqrt{x^2 - 4x + 5}$$

$$\sqrt{g^2 + 1} = \frac{1}{x-2} \sqrt{x^2 - 4x + 5}$$

$$g^2 + 1 = \frac{1}{(x-2)^2} (x^2 - 4x + 5)$$

$$g^2 = \frac{x^2 - 4x + 5 - (x-2)^2}{(x-2)^2} = \frac{1}{(x-2)^2}$$

$$g = \frac{1}{x-2} \rightarrow g(x-3) = \frac{1}{x-3-2} = \frac{1}{x-5}$$

7. Diketahui fungsi $f(x) = \sqrt[3]{1-x^3} + 2$. Invers dari $f(x)$ adalah....

- A. $1 - \sqrt[3]{(x-2)^3}$
- B. $(1 - (x-2)^3)^3$
- C. $(2 - (x-1)^3)^3$
- D. $(1 - (x-2)^3)^{1/3}$
- E. $(2 - (x-1)^3)^{1/3}$

Solusi

Info :

$$f(x) = \sqrt[3]{1-x^3} + 2$$

$$f - 2 = \sqrt[3]{1-x^3}$$

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

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

$$x = \sqrt[3]{1 - (f-2)^3} = (1 - (f-2)^3)^{\frac{1}{3}}$$

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

8. Jika $f(x) = \sqrt{x}$, $x \geq 0$ dan $g(x) = \frac{x}{x+1}$; $x \neq -1$, maka

$$(g \circ f)^{-1}(2) = \dots$$

- A. $\frac{1}{4}$
- B. $\frac{1}{2}$
- C. 1
- D. 2
- E. 4

Solusi

Info :

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

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

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

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

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

$$(g \circ f)^{-1}(2) = \left(\frac{2}{1-2} \right)^2 = 4$$

9. Jika $f(x) = 2x - 3$ dan $(g \circ f)(x) = 2x + 1$, maka $g(x) = \dots$
- A. $x + 4$
 - B. $2x + 3$
 - C. $2x + 5$
 - D. $x + 7$
 - E. $3x + 2$

Solusi

Info :

π Jika $f(x) = ax + b$ dan $(g \circ f)(x) = u(x)$

$$\text{Maka : } g(x) = u\left(\frac{x-b}{a}\right)$$

$$\begin{aligned} \text{✎ } f(x) &= 2x - 3, \\ (g \circ f)(x) &= 2x + 1 \end{aligned}$$

$$g(x) = 2\left(\frac{x+3}{2}\right) + 1 = x + 4$$

Komposisi Fungsi

10. Jika $(f \circ g)(x) = 4x^2 + 8x - 3$ dan $g(x) = 2x + 4$, maka $f^{-1}(x) = \dots$
- A. $x + 9$
 - B. $2 + \oplus x$
 - C. $x^2 - 4x - 3$
 - D. $2 + \sqrt{x+1}$
 - E. $2 + \sqrt{x+7}$

Solusi

Info :

$$\begin{aligned} \pi \quad g(x) &= 2x + 4, \\ (f \circ g)(x) &= 4x^2 + 8x - 3 \\ f(x) &= 4\left(\frac{x-4}{2}\right)^2 + 8\left(\frac{x-4}{2}\right) - 3 \\ &= x^2 - 8x + 16 + 4x - 16 - 3 \\ &= x^2 - 4x - 3 = (x-2)^2 - 7 \\ f^{-1}(x) &= 2 + \sqrt{x+7} \end{aligned}$$

11. Prediksi UAN/SPMB

Jika $f(x) = 2x + 3$ dan $(f \circ g)(x) = 4x^2 + 12x + 7$. Nilai dari $g(1) = \dots$

- A. 10
- B. -12
- C. 9
- D. -9
- E. 8



Solusi

Info :

$$\text{✎ } f(x) = ax + b \text{ dan } (f \circ g)(x) = px^2 + qx + r$$

$$g(x) = \frac{px^2 + qx + r - b}{a}$$

$$\text{maka : } = \frac{4x^2 + 12x + 7 - 3}{2}$$

$$= \frac{4 \cdot 1^2 + 12 \cdot 1 + 7 - 3}{2}$$

$$= 10$$

12. Prediksi UAN/SPMB

$f(x) = 3^{4x}$ maka invers dari $f(x)$ adalah....

- A. ${}^3\log 4x$
- B. ${}^4\log 3x$
- C. ${}^3\log x^4$
- D. ${}^4\log x^3$
- E. ${}^3\log \sqrt[4]{x}$

Solusi

Info :

☞ Jika $f(x) = a^{px}$ maka $f^{-1}(x) = {}^a\log x^{\frac{1}{p}}$

$$f(x) = 3^{4x} \text{ maka } f^{-1}(x) = {}^3\log x^{\frac{1}{4}} = {}^3\log \sqrt[4]{x}$$

13. UAN 2003/P-2/No.16

Ditentukan $g(f(x)) = f(g(x))$. Jika $f(x) = 2x + p$ dan $g(x) = 3x + 120$, maka nilai $p = \dots$

- A. 30
- B. 60
- C. 90
- D. 120
- E. 150

Solusi

Info :

$$\begin{aligned} \text{✉ } g(f(x)) &= f(g(x)) \div g(2x + p) = f(3x + 120) \\ 3(2x + p) + 120 &= 2(3x + 120) + p \\ 6x + 2p + 120 &= 6x + 240 + p \\ 2p - p &= 240 - 120 \\ p &= 120 \end{aligned}$$

14. UAN 2003/P-1/No.16

Jika $f^{-1}(x)$ adalah invers dari fungsi

$$f(x) = \frac{2x+5}{3x-4}, x \neq \frac{4}{3}. \text{ Maka nilai } f^{-1}(2) \text{ sama dengan}$$

- A. 2,75
- B. 3
- C. 3,25
- D. 3,50
- E. 3,75



Smart

Info :

O $f(x) = \frac{ax+b}{cx+d}$, maka

$$f^{-1}(x) = \frac{-dx+b}{cx-a}$$

$$\Rightarrow f(x) = \frac{2x+5}{3x-4} \div f^{-1}(x) = \frac{4x+5}{3x-2}$$

$$f^{-1}(2) = \frac{4 \cdot 2 + 5}{3 \cdot 2 - 2} = \frac{13}{4} = 3,25$$

15. UAN 2003/P-2/No.17

Fungsi $f : \mathbb{R} \setminus \{3\} \rightarrow \mathbb{R}$ didefinisikan sebagai

$$f(x) = \frac{2x-1}{3x+4}, x \neq -\frac{4}{3}. \text{ Invers dari fungsi } f \text{ adalah}$$

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

A. $\frac{4x-1}{3x+2}, x \neq \frac{-2}{3}$

B. $\frac{4x+1}{3x-2}, x \neq \frac{2}{3}$

C. $\frac{4x+1}{2-3x}, x \neq \frac{2}{3}$

D. $\frac{4x-1}{3x-2}, x \neq \frac{2}{3}$

E. $\frac{4x+1}{3x+2}, x \neq \frac{-2}{3}$



Smart

Info :

O $f(x) = \frac{ax+b}{cx+d}$, maka

$$f^{-1}(x) = \frac{-dx+b}{cx-a}$$

☞ $f(x) = \frac{2x-1}{3x+4} \div f^{-1}(x) = \frac{-4x-1}{3x-2} \dots(\text{kali} : -1)$

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

16. UAN 2003/P-1/No.17

Diketahui $f(x) = x + 2$ dan $g(x) = \frac{15}{x}$ untuk $x \neq 0$. Jika

$f^{-1}(x)$ = fungsi invers dari $f(x)$ dan $g^{-1}(x)$ = fungsi invers dari $g(x)$, maka nilai $(f^{-1} \circ g^{-1})(x) = 1$ dipenuhi untuk $x = \dots$

- A. 1
- B. 3
- C. 5
- D. 8
- E. 10



Smart

Info :

○ $f = x + 2$, maka :
 $f^{-1} = x - 2$

○ $g = \frac{15}{x}$, maka $g^{-1} = \frac{15}{x}$

📁 $(f^{-1} \circ g^{-1})(x) = 1$

$$f^{-1}(g^{-1})(x) = 1 \div f^{-1}\left(\frac{15}{x}\right) = 1$$

$$\frac{15}{x} - 2 = 1 \text{ atau } 3x = 15$$

○ Jadi : $x = 5$