

**PEMBAHASAN SOAL
SELEKSI MAHASISWA BARU BERSAMA
SMMB TELKOM 2007
(STT TELKOM, STT TELKOM PPLMI, STMB TELKOM,
DAN NIIT & TELKOM CENTER)**

PEMBAHASAN SOAL MATEMATIKA

1. **Kunci: C**

$$p(x) = 2x^3 - x^2 + ax + 7 \text{ dibagi } (x + 1)$$

$$\text{Sisa } p(-1) = -2 - 1 - a + 7 = 4 - a$$

$$q(x) = x^3 - 3x^2 - 4x - 1 \text{ dibagi } (x + 1)$$

$$\text{Sisa } q(-1) = -1 - 3 + 4 - 1 = -1$$

$$p(-1) = q(-1)$$

$$4 - a = -1$$

$$a = 5$$

2. **Kunci: C**

$$f(x) = 2x$$

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

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

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

3. **Kunci: D**

$$P = \{1, 2, 3, 4\}$$

$$Q = \{x \in \mathbb{R} \mid 1 \leq x < 4\}$$

$$P \cap Q = \{1, 2, 3\}$$

4. **Kunci: D**

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

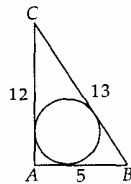
5. **Kunci: B**

Lingkaran dalam segitiga

$$r = \frac{\text{luas segitiga}}{\frac{1}{2} \text{ Keliling segitiga}}$$

$$\text{Kel} = 2\pi r = 4\pi$$

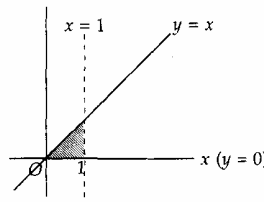
$$\text{dimana } r = \frac{12+5-13}{2} = 2$$



6. **Kunci: B**

$$V = \pi \int_0^1 x^2 dx$$

$$= \pi \frac{1}{3} x^3 \Big|_0^1 = \frac{1}{3} \pi$$



7. **Kunci: E**

$$(\log x)^2 + 2 \cdot \log \left(\frac{2}{x}\right) = 1$$

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

$$2 \log x - 2 \cdot 2 \log x + 1 = 0$$

$$(2 \log x - 1)^2 = 0$$

$$2 \log x = 1 \Rightarrow x = 2$$

8. **Kunci: D**

$$\lim_{x \rightarrow a} \frac{2(\sqrt{a}-\sqrt{x})}{a-x} = \lim_{x \rightarrow a} \frac{2(\sqrt{a}-\sqrt{x})}{(\sqrt{a}-\sqrt{x})(\sqrt{a}+\sqrt{x})} = \frac{2}{2\sqrt{a}} = \frac{1}{\sqrt{a}}$$

9. **Kunci: E**

Syarat:

i) $x > 0$

ii) $x - 1 > 0$

$$x > 1$$

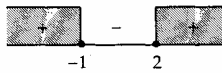
$${}^2\log x + {}^2\log(x-1) \geq 1$$

$${}^2\log(x^2-x) \geq {}^2\log 2$$

$$x^2-x \geq 2$$

$$x^2-x-2 \geq 0$$

$$(x-2)(x+1) \geq 0$$



$$(x < -1 \text{ atau } x \geq 2) \wedge (x > 0) \wedge (x > 1) = x \geq 2$$

10. **Kunci: A**

$$r = \int_0^1 \frac{1}{(4-x)^2} dx = \int_0^1 (4-x)^{-2} dx = \frac{1}{-1 \cdot -1} (4-x)^{-1} \Big|_0^1$$

$$= \frac{1}{4-x} \Big|_0^1 = \frac{1}{3} - \frac{1}{4} = \frac{4-3}{12} = \frac{1}{12}$$

$$a = \lim_{t \rightarrow 2} \frac{t^2-3t+2}{t^2-4} = \lim_{t \rightarrow 2} \frac{2t-3}{2t} = \frac{1}{4}$$

$$S_{\infty} = \frac{a}{1-r} = \frac{\frac{1}{4}}{1-\frac{1}{12}} = \frac{\frac{1}{4}}{\frac{11}{12}} = \frac{3}{11}$$

11. **Kunci: B**

$$PQ = M$$

$$P = MQ^{-1} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \frac{1}{3-2} \begin{pmatrix} 3 & -2 \\ -1 & 1 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 3 & -2 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 2 & -1 \\ 2 & -1 \end{pmatrix}$$

12. **Kunci: B**

$$cx^2 - bx + a = 0$$

$$x_1^2 + x_2^2 = (x_1 + x_2)^2 - 2x_1x_2 = \left(\frac{b}{c}\right)^2 - 2\left(\frac{a}{c}\right)$$

$$= \frac{b^2 - 2ac}{c^2}$$

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13. Kunci: D

	Jenis A	Jenis B	
Daya tampung	x	y	40
Harga	1 juta	4 juta	100 juta
Untung	200.000	350.000	

$$f(x, y) = 200.000x + 350.000y$$

$$\text{Syarat: } x \geq 0, y \geq 0$$

$$x + y \leq 40$$

$$x + 4y \leq 100$$

$$x + y = 40$$

$$x + 4y = 100$$

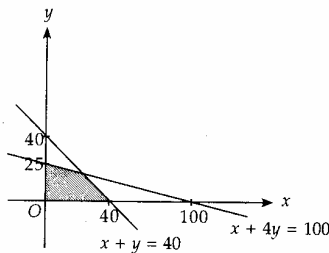
$$-3y = -60$$

$$y = 20$$

$$x = 20$$

$$(20, 20)$$

(x, y)	$200.000x + 350.000y$
(40, 0)	8.000.000
(0, 25)	8.750.000
(20, 20)	11.000.000 maks



Jadi, jumlah jenis HP B = 20.

14. Kunci: B

$$x + y = 10$$

$$z = xy \text{ maks}$$

$$= x(10 - x) = 10x - x^2$$

$$z' = 0$$

$$10 - 2x = 0$$

$$x = 5$$

$$y = 5$$

Jadi, $x - y = 0$.

15. Kunci: E

$$\frac{\cot^2 t + 2\sqrt{3} \cot t - 1 = \csc^2 t}{\cos^2 t + 2\sqrt{3} \cos t \sin t - \sin^2 t = 1} \times \sin^2 t$$

$$\cos^2 t + 2\sqrt{3} \cos t \sin t - \sin^2 t = 1$$

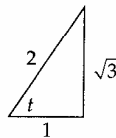
$$\cos^2 t - 1 + 2\sqrt{3} \cos t \sin t - \sin^2 t = 0$$

$$2\sqrt{3} \cos t \sin t - 2\sin^2 t = 0$$

$$2\sin t (\sqrt{3} \cos t - \sin t) = 0$$

$$\sin t = 0 \vee \tan t = \sqrt{3}$$

$$\sin t = \frac{1}{2}\sqrt{3}$$



16. Kunci: C

$$2 + 5 + 8 + 11 + \dots + 62$$

$$U_n = a + (n - 1)b$$

$$62 = 2 + 3n - 3$$

$$63 = 3n$$

$$21 = n$$

$$S_{21} = \frac{21}{2}(2 + 62) = 21(32) = 672$$

17. Kunci: E

$$\int_0^1 x\sqrt{1-x^2} dx = \int_0^1 x(1-x^2)^{\frac{1}{2}} dx$$

$$= -\frac{1}{3}(1-x^2)^{\frac{3}{2}} \Big|_0^1 = -\frac{1}{3}(0-1) = \frac{1}{3}$$

18. Kunci: E

$$x^2 - 1 < 2x - 3$$

$$x^2 - 2x + 2 < 0$$

$$a = 1 > 0$$

$$D = -4 < 0 \} \text{ Definit positif}$$

$$HP = \{ \}$$

19. Kunci: C

$$P = \{x \in \mathbb{R} \mid x^2 - x - 6 < 0\}$$

$$= \{x \in \mathbb{R} \mid (x - 3)(x + 2) < 0\}$$

$$= \{x \in \mathbb{R} \mid -2 < x < 3\}$$

$$Q = \{x \in \mathbb{R} \mid x^2 + 3x + 2 > 0\}$$

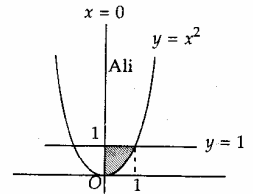
$$= \{x \in \mathbb{R} \mid (x + 2)(x + 1) > 0\}$$

$$= \{x \in \mathbb{R} \mid x > -2 \cap x > -1\}$$

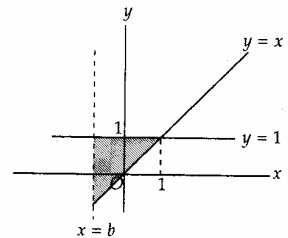
$$\text{Maka } P \cap Q = \{x \in \mathbb{R} \mid -1 < x < 3\}$$

20. Kunci: A

$$\begin{aligned} L_1 &= \int_0^1 1 - x^2 dx = x - \frac{1}{3}x^2 \Big|_0^1 \\ &= 1 - \frac{1}{3} = \frac{2}{3} \end{aligned}$$



$$\begin{aligned} L_2 &= 3L_1 \\ \int_b^1 (1 - x) dx &= 3 \left(\frac{2}{3} \right) \\ x - \frac{1}{2}x^2 \Big|_b^1 &= 2 \\ \left(1 - \frac{1}{2} \right) - \left(b - \frac{1}{2}b^2 \right) &= 2 \end{aligned}$$



$$\begin{aligned} \frac{1}{2}b^2 - b - \frac{3}{2} &= 0 \\ b^2 - 2b - 3 &= 0 \\ (b - 3)(b + 1) &= 0 \\ b = 3 \vee b = -1 \end{aligned}$$

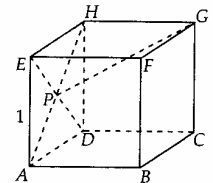
21. Kunci: D

$$\begin{aligned} AH^2 &= AD^2 + DH^2 \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$AH = \sqrt{2}$$

$$\begin{aligned} GP^2 &= DH^2 + HG^2 \\ &= \left(\frac{1}{2}\sqrt{2} \right)^2 + 1^2 = \frac{2}{4} + 1 = \frac{1}{2} + \frac{2}{2} = \frac{3}{2} \end{aligned}$$

$$GP = \frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{3}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{1}{2}\sqrt{6}$$



22. Kunci: B

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

$$\text{maka } f(x^2) + [f(x)]^2 - 3f(x)$$

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

$$= -x$$

23. Kunci: C

$$x \log \left(\frac{1}{2} \right) = -3$$

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

$$2 = x^3$$

$$x = \sqrt[3]{2}$$

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24. Kunci: A

$$\frac{\cos x}{\sin x} = \frac{1}{4} \begin{cases} \cot x = \frac{1}{4} \\ \tan x = 4 \end{cases}$$

Jadi, $\frac{\cot x}{\tan x} = \frac{1}{4} = \frac{1}{16}$.

25. Kunci: D

$$\begin{aligned} \text{Banyaknya cara} &= \binom{3}{1} \binom{3}{1} \binom{4}{1} \binom{7}{1} \\ &= 3 \cdot 3 \cdot 4 \cdot 7 \\ &= 252 \end{aligned}$$

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