Pembahasan Latihan Soal

TKD Saintek - Matematika

Latihan TKD Saintek Memuat materi :

1) Kemampuan Matematika
2) Kemampuan Biologi
3) Kemampuan Kimia
4) Kemampuan Fisika

@ujiantulis.com

Untuk Persiapan Ujian Tulis

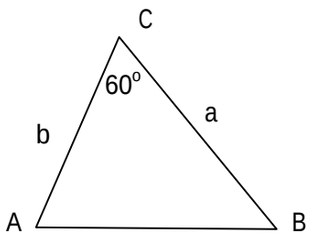
Sbmptn 2018

Oleh Team UjianTulis.com

2 Pembahasan Soal

Disusun oleh : Team ujiantulis.com

1. **Jawab: B**



$$AB^2 = a^2 + b^2 - 2ab\cos C$$
$$= (a+b)^2 - 2ab - 2ab\cos 60^o$$
$$= 4^2 - 2\cdot 2 - 2\cdot 2\cdot \frac{1}{2}$$
$$= 10$$

$$AB = \sqrt{10}$$

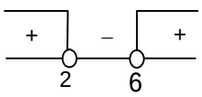
2. **Jawab: D**

Persamaan garis g

$$y - y_1 = m(x - x_1)$$
$$y - 3 = m(x - 2)$$
$$y = mx - 2m + 3$$

Garis g memotong $y = x^2$ di dua titik berbeda, maka

$$x^2 = mx - 2m + 3$$
$$x^2 - mx + 2m - 3 = 0$$
$$D > 0$$
$$m^2 - 8m + 12 > 0$$
$$(m-2)(m-6) > 0$$



$$m < 2 \text{ atau } m > 6$$

3. **Jawab: E**

Diketahui $\begin{cases} y = 5x \\ y = x^2 - (2p-9)x + 3q \end{cases}$ penyelesaian $\{(p, y_1), (q, y_2)\}$

$$y = y$$
$$x^2 - (2p-9)x + 3q = 5x$$
$$x^2 - (2p-4)x + 3q = 0$$

Akar-akarnya p dan q

$$pq = \frac{C}{A} = 3q \qquad p + q = -\frac{B}{A} = 2p - 4$$
$$p = 3 \qquad 3 + q = 6 - 4$$
$$q = -1$$

Titik potong

$(p,m) \rightarrow m = y = 5x = 5p = 15$

$(q,n) \rightarrow q = y = 5x = 5q = -5$

Maka $m + n = 10$

4. **Jawab: C**

Sifat-sifat determinan

1. $\det(A^t) = \det(A)$
2. $\det(A^{-1}) = \frac{1}{\det(A)}$
3. $\det(AB) = \det(A)\ \det(B)$
4. $\det(k\,A) = k^n \det(A)$

Dengan A dan B matriks ordo n

Dan k konstanta

$$P^{-1} = 6P^t$$
$$\det(P^{-1}) = \det(6P^t)$$
$$\frac{1}{\det(P)} = 6^2 \det(P^t)$$
$$\frac{1}{\det(P)} = 36 \det(P)$$
$$\left(\det(P)\right)^2 = \frac{1}{36}$$
$$\det(P) = \pm\sqrt{\frac{1}{36}} = \pm\frac{1}{6}$$

5. **Jawab: A**

$$\bar{X} = 16$$
$$\frac{\overbrace{0+1+2+3+\ldots+28}^{\text{pilih 29 bilangan non negatif terkecil yang mungkin}} + x_{maks}}{30} = 16$$
$$\frac{29}{2}(0+28) + x_{maks} = 480$$
$$406 + x_{maks} = 480$$
$$x_{maks} = 74$$

6. **Jawab: E**

Titik potong

$$y = y$$

$$2^x + 3 = 18 - 9 \cdot 2^{-x+2}$$

$$2^x + 3 = 18 - \frac{36}{2^x}$$

Misalkan $p = 2^x$

$$p + 3 = 18 - \frac{36}{p}$$

———kali p

$$p^2 + 3p = 18p - 36$$

$$p^2 - 15p + 36 = 0$$

$$(p-3)(p-12) = 0$$

$p = 3$	atau	$p = 12$
$2^{x_1} = 3$		$2^{x_2} = 12$
$x_1 = {}^2\log 3$		$x_2 = {}^2\log 12$
$y_1 = 2^{x_1} + 3 = 6$		$y_2 = 2^{x_2} + 3 = 15$

Dengan demikian

$$\Delta x = x_2 - x_1 = {}^2\log 12 - {}^2\log 3 = {}^2\log\frac{12}{3} = {}^2\log 4 = 2$$

$$\Delta y = y_2 - y_1 = 15 - 6 = 9$$

$$AB = \sqrt{\Delta x^2 + \Delta y^2} = \sqrt{4 + 81} = \sqrt{85}$$

7. **Jawab: B**

$$^{(3-\sqrt{7})}\log 32 = a$$

$$^{(3-\sqrt{7})}\log 2^5 = a$$

$$5 \cdot {}^{(3-\sqrt{7})}\log 2 = a$$

$$^{(3-\sqrt{7})}\log 2 = \frac{a}{5}$$

Dengan demikian ...

$$^8\log(3+\sqrt{7}) = {}^{2^3}\log\left(\frac{(3+\sqrt{7})(3-\sqrt{7})}{(3-\sqrt{7})}\right)$$

$$= \frac{1}{3}\,{}^2\log\left(\frac{2}{3-\sqrt{7}}\right)$$

$$= \frac{1}{3}({}^2\log 2 - {}^2\log(3-\sqrt{7}))$$

$$= \frac{1}{3}(1 - \frac{5}{a})$$

$$= \frac{a-5}{3a}$$

8. **Jawab: C**

Titik singgung : $x = \frac{3\pi}{2}$

$$y = \frac{2 + \cos \frac{3\pi}{2}}{\sin \frac{3\pi}{2}} = \frac{2 + 0}{-1} = -2$$

Gradien garis singgung

$$f'(x) = \frac{u' v - u v'}{v^2}$$

$$= \frac{-\sin^2 x - (2 + \cos x)\cos x}{\sin^2 x}$$

$$f'\left(\frac{3\pi}{2}\right) = \frac{-1 - (2 + 0)\, 0}{(-1)^2} = -1$$

Persamaan garis singgungnya

$y - y_1 = m(x - x_1)$

$y + 2 = -1\left(x - \frac{3\pi}{2}\right)$

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

Diketahui memotong sumbu y dititik (0,b)

$b = \frac{3\pi}{2} - 2$

9. **Jawab: E**

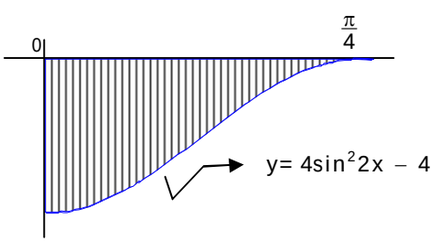
$y = 4\sin^2 2x - 4$

$= 4\left(\frac{1}{2} - \frac{1}{2}\cos 4x\right) - 4$

$= -2\cos 4x - 2$

Plot beberapa titik dari grafik

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$
y	–4	–2	0



Luas diarsir = $\int_0^{\frac{\pi}{4}} (y_{atas} - y_{bawah})\, dx$

$= \int_0^{\frac{\pi}{4}} (0 - (4\sin^2 2x - 4))\ dx$

$= \int_0^{\frac{\pi}{4}} (2 + 2\cos 4x)\ dx$

$= 2x + \frac{1}{2}\sin 4x \Big|_0^{\frac{\pi}{4}}$

$= \frac{\pi}{2}$

10. **Jawab: A**

$f(x) = ax^3 + 3bx^2 + (2a - b)x + 4$

f(x) : (x – 1) sisanya 10

artinya f(1) = 10

a + 3b + 2a – b + 4 = 10

3a + 2b = 6 .....(1)

f(x) : (x + 2) sisanya 2

artinya f(–2) = 2

– 8a + 12b – 4a + 2b + 4 = 2

–12a + 14b = – 2

– 6a + 7b = – 1 .....(2)

6a + 4b = 12

–6a + 7b = –1 +

11b = 11 $\rightarrow$ b = 1 ; a = $\frac{4}{3}$

11. **Jawab: A**

$x^3 - 14x^2 + bx + c = 0$ akar-akar x_1, x_2 dan x_3

Diketahui juga:

Geometri: x_1, x_2 dan x_3

Aritmatika: x_1, $x_2 + 1$ dan x_3

Dari barisan aritmatika dan suku banyak

$$\begin{aligned} S_3 &= x_1 + x_2 + 1 + x_3 \\ &= x_1 + x_2 + x_3 + 1 \\ &= -\frac{B}{A} + 1 \\ &= 14 + 1 \\ &= 15 \end{aligned} \quad \Bigg\| \quad \begin{aligned} S_3 &= 15 \\ u_2 - b + u_2 + u_2 + b &= 15 \\ 3u_2 &= 15 \\ u_2 &= 5 \\ x_2 + 1 &= 5 \\ x_2 &= 4 \end{aligned}$$

Dari barisan geometri dan suku banyak

$$x_1 \cdot x_2 \cdot x_3 = -\frac{D}{A} = -c$$

$$\frac{x_2}{r} \cdot x_2 \cdot x_2 r = -c$$

$$x_2{}^3 = -c$$

$$c = -x_2{}^3 = -4^3 = -64$$

12. **Jawab: D**

Lingkaran $x^2 + y^2 = 9 \Rightarrow$ Pusat (0,0)

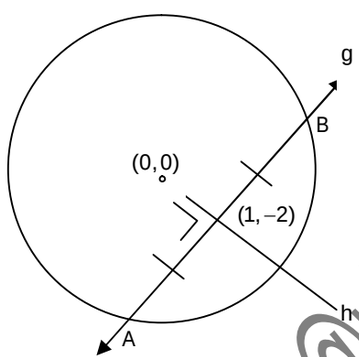
Karena $(1, -2)$ titik tengah tali busur AB, maka garis h yang melalui pusat (0,0) dan $(1, -2)$ akan tegak lurus g

$$m_h = \frac{-2-0}{1-0} = -2$$

$$g \perp h \Rightarrow m_g \cdot m_h = -1 \Rightarrow m_g = \frac{-1}{m_h} = \frac{1}{2}$$

Garis g: $y - y_1 = m(x - x_1)$

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



13. **Jawab: D**

$\vec{a}$ sejajar $\vec{b}$

$\vec{a} = \alpha \vec{b}$

$$\begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix} = \alpha \begin{pmatrix} 4 \\ k-1 \\ m+1 \end{pmatrix}$$

$2 = 4\alpha$

$\alpha = \frac{1}{2}$

$1 = \alpha(k-1)$ $\quad 1 = \alpha(m+1)$

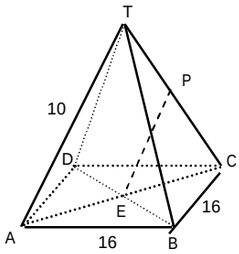
$1 = \frac{1}{2}(k-1)$ $\quad 1 = \frac{1}{2}(m+1)$

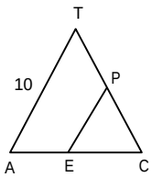
$2 = k - 1$ $\quad 2 = m + 1$

$k = 3$ $\quad m = 1$

$k + m = 4$

14. **Jawab: E**





PE = Jarak P ke BD

Karena CE = $\frac{1}{2}$ CA dan CP = $\frac{1}{2}$ CT, Maka ΔCEP dan ΔCAT sebangun. Akibatnya PE = $\frac{1}{2}$ DT = 5

15. **Jawab: C**

Untuk membuat segitiga

2 titik dari garis g dan 1 titik dari garis h

atau

1 titik dari garis g dan 2 titik dari garis h

Jadi banyak caranya

$= C_2^6 \cdot C_1^4 + C_1^6 \cdot C_2^4$

$= \frac{6!}{4! \cdot 2!} \cdot \frac{4!}{3! \cdot 1!} + \frac{6!}{5! \cdot 1!} \cdot \frac{4!}{2! \cdot 2!}$

$= \frac{6 \cdot 5 \cdot 4!}{4! \cdot 2} \cdot \frac{4 \cdot 3!}{3! \cdot 1} + \frac{6 \cdot 5!}{5! \cdot 1} \cdot \frac{4 \cdot 3 \cdot 2!}{2! \cdot 2}$

$= 15 \cdot 4 + 6 \cdot 6$

$= 96$