

سوال ۱۲۷

$$S_{20} = \frac{20}{2} (1 + 20) = 210$$

$$S_{29} = \frac{29}{2} (1 + 29) = 420 + 1 = 421$$

$$= 420 - 20 + 1 = 401$$

سوال ۱۲۸

$$a_{200} = a_1 + 199d = 1 + 199 \times 2 = 399$$

$$a_{400} = a_1 + 399d = 1 + 399 \times 2 = 799$$

سوال ۱۲۹: $f(x) = x - f^{-1}(x)$ و $f^{-1}(x) = x - f(x)$

$$x \geq f^{-1}(x) \Rightarrow f(x) \geq f(f^{-1}(x)) \Rightarrow f(x) \geq x$$

این تغییر معادله را می توانیم به شکل $f(x) = x$ در نظر بگیریم و جواب آن را می توانیم به دست آوریم.

[۱۲۸]

سوال ۱۳۸

$$\frac{\cos(270^\circ + 10^\circ) - \sin(270^\circ - 10^\circ)}{\sin(90^\circ - 10^\circ) - \cos(90^\circ + 10^\circ)} = \frac{\sin 10^\circ + \cos 10^\circ}{\sin 10^\circ - \cos 10^\circ} = \frac{\tan 10^\circ + 1}{\tan 10^\circ - 1}$$

$$\frac{\sin(270^\circ + 10^\circ) - \sin(270^\circ - 10^\circ)}{\sin(90^\circ - 10^\circ) - \cos(90^\circ + 10^\circ)}$$

تبدیل سینوس و کسینوس به تانژانت

$$= \frac{\frac{1}{\sqrt{2}} + 1}{\frac{1}{\sqrt{2}} - 1} = \frac{1 + \sqrt{2}}{1 - \sqrt{2}} = \frac{1 + \sqrt{2}}{1 - \sqrt{2}} \cdot \frac{1 + \sqrt{2}}{1 + \sqrt{2}} = \frac{1 + 2\sqrt{2} + 2}{1 - 2} = \frac{3 + 2\sqrt{2}}{-1} = -3 - 2\sqrt{2}$$

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سوال ۱۲۹

$$A - B = \begin{bmatrix} 11-1 & -1-(-4) \\ 1-2 & 0-2 \end{bmatrix} = \begin{bmatrix} 10 & 3 \\ -1 & -2 \end{bmatrix} \rightarrow \det(A-B) = (10 \times -2) - (3 \times -1) = -20 + 3 = -17$$

$$(A-B)^{-1} = \frac{\begin{bmatrix} 2 & 3 \\ 1 & 10 \end{bmatrix}}{-17} = \begin{bmatrix} -2/17 & -3/17 \\ -1/17 & -10/17 \end{bmatrix}$$

سوال ۱۴۲: $\lim_{x \rightarrow a} f(x) = L$ یعنی $f(x)$ به L میل می‌کند (در صورتیکه a در دامنه f باشد)

$$\lim_{x \rightarrow a^+} f(x) = \lim_{x \rightarrow a^-} f(x)$$

$$\lim_{x \rightarrow y^+} f(x) = \sin \frac{\sqrt{x}}{y} = \frac{1}{y} \Rightarrow a + \frac{r}{\epsilon} = \frac{1}{y} \Rightarrow a = \frac{1}{y} - \frac{r}{\epsilon} = \frac{1}{y}$$

$$\lim_{x \rightarrow y^+} f(x) = a + \cos \frac{\sqrt{x}}{y} = a + \left(\frac{\sqrt{r}}{y}\right)^2 = a + \frac{r}{\epsilon}$$

سوال ۱۴۷: $\lim_{x \rightarrow 1} \frac{f(x) - f(1)}{x - 1} = \frac{f(1.1) - f(1)}{1.1 - 1} = \frac{1.1 - 1}{0.1} = \frac{0.1}{0.1} = 1$

سوال ۱۴۸: $\frac{df}{dx} = f'(1) = \frac{1}{\sqrt{x}} \Big|_{x=1} = \frac{1}{2} \Rightarrow \frac{1}{2} - \frac{1}{1} = -\frac{1}{2}$

سوال ۱۴۹: $\lim_{x \rightarrow 1} \left(\frac{1}{x} \times \left(\frac{x}{2}\right)^2 \times \left(\frac{1}{x}\right)^2 \right) = \frac{1}{2} + \frac{1}{2} = 1$

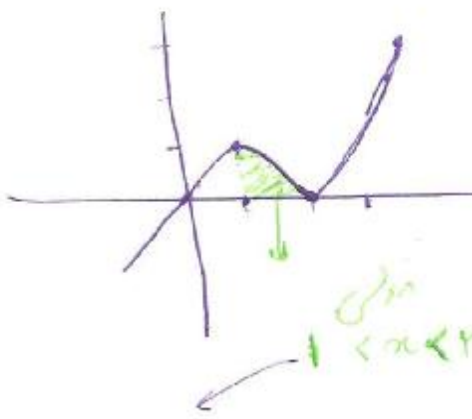
سوال ۱۴۹: اگر α و β ریشه‌های $x^2 - 5x + p = 0$ باشند، داریم:

$$S = (\frac{1}{\alpha} - 1) + (\frac{1}{\beta} - 1) = \frac{\alpha + \beta}{\alpha\beta} - 2$$

$$\Rightarrow S = \frac{5}{-1} - 2 = -5 - 2 = -7$$

$$P = (\frac{1}{\alpha} - 1) \times (\frac{1}{\beta} - 1) = \frac{1}{\alpha\beta} - \left(\frac{\alpha + \beta}{\alpha\beta}\right) + 1$$

$$= -1 - \left(\frac{5}{-1}\right) + 1 = 5$$



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$$y = |x-2| = \begin{cases} x^2 - 4 & x \geq 2 \\ 4 - x^2 & x < 2 \end{cases}$$

$$\Rightarrow y = 4 - x^2 \Rightarrow -(x-1)^2 + 1$$

$$\frac{x-1}{y-1} = 0 \Rightarrow 0 < y < 1$$

$$= \begin{cases} (x-1)^2 - 1 & x \geq 2 \\ -(x-1)^2 + 1 & x < 2 \end{cases}$$

$$\Rightarrow -y + 1 = (x-1)^2$$

$$\Rightarrow x-1 = \sqrt{-y+1} \Rightarrow x = 1 + \sqrt{-y+1}$$

$$\Rightarrow f^{-1}(y) = 1 + \sqrt{-y+1}$$

$$a_n = \frac{v + \varepsilon^{n-1}}{r + \varepsilon^n} = \frac{1}{\varepsilon} \left(\frac{v + \varepsilon^{n-1}}{\frac{1}{\varepsilon} + \varepsilon^{n-1}} \right) = \frac{1}{\varepsilon} \left(\frac{\frac{1}{\varepsilon} + \frac{1}{\varepsilon} + \varepsilon^{n-1}}{\frac{1}{\varepsilon} + \varepsilon^{n-1}} \right)$$

$$= \frac{1}{\varepsilon} \left(\frac{\frac{1}{\varepsilon}}{\frac{1}{\varepsilon} + \varepsilon^{n-1}} + 1 \right)$$

$\lim_{n \rightarrow \infty} \frac{v + \varepsilon^{n-1}}{r + \varepsilon^n} = \lim_{n \rightarrow \infty} \frac{\varepsilon^{n-1} + \frac{1}{\varepsilon}}{\varepsilon^n + \frac{1}{\varepsilon}} = \frac{1}{\varepsilon}$

توجه: در صورتی که $\varepsilon < 1$ باشد، $\varepsilon^n \rightarrow 0$ و در صورتی که $\varepsilon > 1$ باشد، $\varepsilon^n \rightarrow \infty$

$$f(t) = a_0 - \varepsilon_0 e^{-\gamma t} \geq v_0$$

$$\Rightarrow \varepsilon_0 e^{-\gamma t} \leq v_0 \Rightarrow e^{-\gamma t} \leq \frac{v_0}{\varepsilon_0} \Rightarrow -\gamma t \leq \ln \frac{v_0}{\varepsilon_0}$$

$$\Rightarrow \gamma t \geq \ln \frac{\varepsilon_0}{v_0} \Rightarrow t \geq \frac{\ln \frac{\varepsilon_0}{v_0}}{\gamma}$$

$$r \cos^2 x + r \sin x \cos x = 1$$

$$\Rightarrow r \cos^2 x - 1 + \sin x \cos x = 0$$

$$\cos^2 x + \sin x \cos x = \frac{1}{r}$$

$$\div \cos x \Rightarrow 1 + \tan x = \frac{1}{r \cos x} \Rightarrow \tan x = -1 \Rightarrow x = \frac{3\pi}{4} - \frac{\pi}{2} = \frac{\pi}{4}$$

$$f \circ g(x) = \frac{\epsilon}{\omega} (\epsilon x + \omega) - \frac{1}{\omega} |\epsilon x + \omega|$$

$$= \frac{1\epsilon}{\omega} x + \frac{\epsilon}{\omega} |\omega| - \left| \frac{\epsilon}{\omega} x + \frac{1}{\omega} |\omega| \right|$$

$$= \begin{cases} \frac{1\epsilon}{\omega} x + \frac{\epsilon}{\omega} \omega - \frac{\epsilon}{\omega} x - \frac{1}{\omega} \omega & x \geq 0 \\ \frac{1\epsilon}{\omega} x - \frac{\epsilon}{\omega} \omega + \frac{\epsilon}{\omega} \omega + \frac{1}{\omega} \omega & x < 0 \end{cases}$$

$$= \begin{cases} \epsilon x & x \geq 0 \\ \epsilon x & x < 0 \end{cases} \Rightarrow (f \circ g(x))' = \epsilon$$

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$$\frac{d}{dx} y' = \frac{\epsilon}{\sqrt{\epsilon x}} e^{\epsilon x} - \sqrt{\epsilon x} e^{\epsilon x} \Big|_{x=\epsilon} = \frac{1}{\epsilon} - \epsilon = -\frac{\epsilon}{\epsilon}$$

$$\text{تقریب: } y - \epsilon = -\frac{\epsilon}{\epsilon} (x - \epsilon) \Rightarrow x = 0 \quad y = \epsilon + \epsilon = 2\epsilon \Rightarrow y = \omega$$

$$f(x) = \epsilon x^2 - \epsilon(x + \epsilon)x + \epsilon > 0$$

$$\Rightarrow \begin{cases} a > 0 \\ \Delta < 0 \end{cases} \quad a = \epsilon > 0 \Rightarrow \Delta = \epsilon(x + \epsilon)^2 - \epsilon(x)(x) < 0$$

$$\Rightarrow \epsilon(x + \epsilon)^2 < \epsilon x^2 \Rightarrow (x + \epsilon)^2 < x^2$$

$$\Rightarrow -\epsilon < x + \epsilon < \epsilon \Rightarrow -2\epsilon < x < 0$$

$$\text{پول عمیق: } x = \frac{-b}{2a} = \frac{x + \epsilon}{\epsilon} \Rightarrow$$

$$-\epsilon < x + \epsilon < \epsilon \Rightarrow -2\epsilon < \frac{x + \epsilon}{\epsilon} < 2\epsilon$$

$$f(0) = \frac{0 + 0 + 1}{0 + \epsilon} = \epsilon \Rightarrow y = \epsilon \quad \text{مختصات}$$

$$\Rightarrow \lim_{x \rightarrow \pm\infty} \frac{ax^2 + bx + 1}{x^2 + \epsilon} = a = \epsilon$$

$$\Delta = 0 \Rightarrow y = 0 \Rightarrow ax^2 + bx + 1 = 0$$

$$\Rightarrow b^2 - \epsilon a(1) = b^2 - \epsilon x^2 x \Lambda = 0 \Rightarrow b^2 = \epsilon \epsilon \Rightarrow \begin{cases} b = 1 \\ b = -1 \end{cases}$$

$$\frac{-b}{2a} > 0 \Rightarrow \frac{-b}{\epsilon} > 0 \Rightarrow b < 0 \Rightarrow b = -1$$

چون مختصات محور x و y است

چون برتر است مختصات

$$F \left| \begin{array}{l} -\frac{a}{\epsilon} \\ -r \end{array} \right.$$

$$x-a = \frac{1r}{\epsilon} - \left(-\frac{a}{\epsilon}\right) = \frac{1a}{\epsilon}$$

$$\Rightarrow a = -\frac{4}{\epsilon}$$

$$\Rightarrow a = \left(-\frac{a}{\epsilon}, -r\right)$$

$$\text{مثلاً } \left| \begin{array}{l} -\frac{a}{\epsilon} + \frac{4}{\epsilon} \\ -r \end{array} \right. = 1$$

$$\Rightarrow (y+r)^r = \epsilon \left(-\frac{4}{\epsilon}\right) / (x-1)$$

$$\Rightarrow (y+r)^r = 4(1-x) \quad y=0 \quad \epsilon = 4-4x$$

$$\Rightarrow 4x = 4 \Rightarrow x = \frac{3}{4}$$

$$ay^r - \epsilon x^r - r \cdot y = 0$$

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$$ay^r - r \cdot y - \epsilon x^r = 0 \Rightarrow a(y^r - \epsilon x^r + \epsilon) - \epsilon x^r - r \cdot y = 0$$

$$\div r \Rightarrow \frac{(y-r)^r}{r} - \frac{x^r}{a} = 1$$

$$\Rightarrow \left. \begin{array}{l} a^r = \epsilon \Rightarrow a = \sqrt[r]{\epsilon} \\ b^r = a \Rightarrow b = \sqrt[r]{a} \end{array} \right\} \Rightarrow C^r = r^r + (r\sqrt[r]{a})^r = 9 \Rightarrow C = r$$

$$\left. \begin{array}{l} a = C \\ b = \sqrt[r]{a} \\ C = r \end{array} \right\}$$

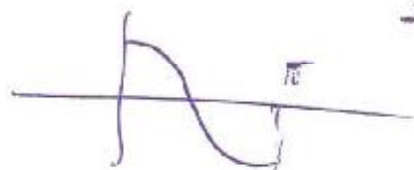
$$\frac{(x-a)^r}{a} + \frac{(y-r)^r}{a} = 1 \Rightarrow 4x^r + ay^r - r \cdot y = r \cdot a$$

$$\int_0^{\pi} \frac{dx}{\sqrt{1+\tan^4 x}} = \int_0^{\pi} |\cos x| dx = \int_0^{\frac{\pi}{4}} \cos x dx + \int_{\frac{\pi}{4}}^{\pi} -\cos x dx$$

$$= \sin x \Big|_0^{\frac{\pi}{4}} + (-\sin x) \Big|_{\frac{\pi}{4}}^{\pi}$$

$$= (1-0) + (0+1) = 2$$

$$1 + \tan^4 x = \frac{1}{\cos^4 x}$$

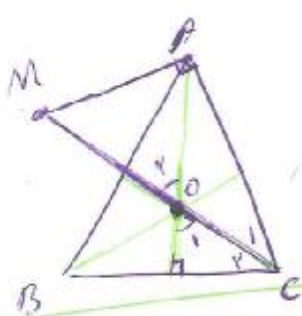


$$\int \frac{\sqrt{x^2 - \epsilon x}}{\sqrt{x^2}} dx = \int \frac{\sqrt{x^2}}{x^{\frac{3}{2}}} dx - \int \frac{\epsilon x}{x^{\frac{3}{2}}} dx$$

$$= \int \sqrt{x}^{\frac{1}{2}} dx - \int \epsilon x^{\frac{1}{2}} dx = \frac{2}{3} x^{\frac{3}{2}} - \epsilon x^{\frac{1}{2}} + C$$

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

100 حل



$$M = a_0 - c_1$$

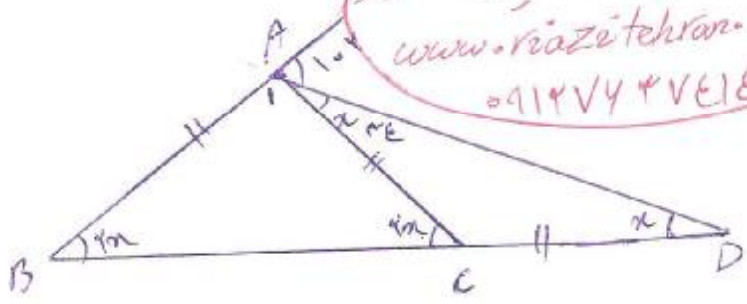
$$O_1 = O_2 = a_0 - c_2 \Rightarrow M = O_2$$

100 حل

$$\Rightarrow \overline{AM} = \overline{OA}$$

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100 حل



$$A_1 + x + 1.0 \cdot y = 1A_0$$

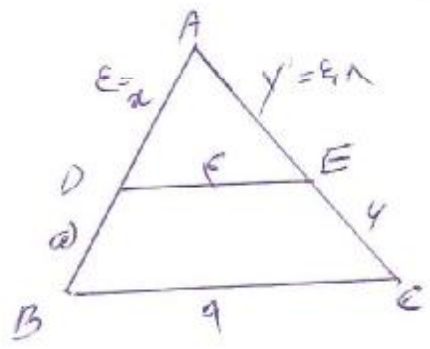
$$\epsilon x + \alpha + A_1 = 1A_0$$

$$\Rightarrow \epsilon x + A_1 = A_1 + x + 1.0 \cdot y$$

$$(\epsilon x = 1.0 \cdot y) \Rightarrow x = y$$

$$\Rightarrow A_1 = 1A_0 - (1.0 \cdot y + \epsilon x) = \epsilon \epsilon$$

100 حل



$$\frac{x}{x+y} = \frac{\epsilon}{a} \Rightarrow a x = \epsilon x + y$$

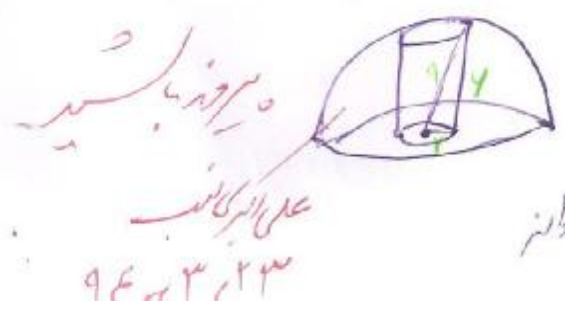
$$\Rightarrow x = y$$

$$\frac{x}{y+y} = \frac{\epsilon}{a} \Rightarrow a y = \epsilon y + y$$

$$\Rightarrow y = \epsilon / a$$

$$\Rightarrow P = \epsilon + \epsilon + \epsilon / a = 1.2 / a$$

100 حل



$$r^2 = a^2 - y^2 = 4r^2 = \epsilon \omega$$

$$V = \omega r^2 / 2 = \omega \times (\epsilon \omega) \times y = 4\omega^2 \omega$$