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 مؤلف. مراجع و مسائل و مشورہ کی ریاضی کا نو
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لسہرہ قافلے
 ریاضی تجزیہ ۱۴۰۳

۱۱۱

$$-m x^2 + m x + 1 = -m - x \Rightarrow m x^2 - (1+m)x - 1 - m = 0$$

$\Delta < 0$

$$\Rightarrow \Delta = (1+m)^2 - 4m(-1-m) < 0$$

$$\Rightarrow (1+m)(1+m+4m) < 0 \Rightarrow (1+m)(5m+1) < 0$$

$$\Rightarrow -1 < m < -\frac{1}{5} \quad \text{عدر صغیر رہو رہنا}$$

$$f \circ g^{-1}(a) = -\frac{1}{8} \Rightarrow f(g^{-1}(a)) = -\frac{1}{8}$$

$$f\left(\frac{1}{\varepsilon}\right) = -\frac{1}{8}$$

$$\Rightarrow g^{-1}(a) = \frac{1}{\varepsilon} \Rightarrow g\left(\frac{1}{\varepsilon}\right) = a \Rightarrow a = -\frac{1}{8}$$

$$\alpha + \beta = -\frac{b}{a} = \frac{-2}{25\alpha}$$

$$\alpha\beta = \frac{c}{a} = \frac{\beta}{25\alpha} \Rightarrow 25\alpha^2 = 1 \Rightarrow \alpha = \pm \frac{1}{5}$$

$$\Rightarrow \begin{cases} \alpha = \frac{1}{5} \xrightarrow{\text{①}} \frac{1}{5} + \beta = -\frac{2}{5} \Rightarrow \beta = -\frac{3}{5} & \beta < \alpha < 0 < \varepsilon \\ \alpha = -\frac{1}{5} \xrightarrow{\text{②}} -\frac{1}{5} + \beta = \frac{2}{5} \Rightarrow \beta = \frac{3}{5} & \beta > \alpha < 0 \end{cases}$$

$$x_5 = -\frac{b}{2a} = \frac{-1}{2 \cdot 5} = \frac{1}{5} \quad \text{نقطه اول}$$

$$\Rightarrow y_5 = -5\left(\frac{1}{5}\right)^2 + \frac{4}{5} + \frac{3}{5} = \frac{6}{5}$$

نقطه اول $S\left(\frac{1}{5}, \frac{6}{5}\right)$

$$-4 < \frac{-1}{3-x} < 0 \Rightarrow -4 < \frac{1}{x-3} < 0 \quad \text{نقطه اول}$$

$$\Rightarrow \begin{cases} \frac{1}{x-3} > -4 \Rightarrow \frac{1+4x-12}{x-3} > 0 \quad (1) \\ \frac{1}{x-3} < 0 \Rightarrow x-3 < 0 \Rightarrow x < 3 \quad (2) \end{cases}$$

$$(1) \frac{4x-11}{x-3} > 0 \Rightarrow x < \frac{11}{4} \cup x > 3 \quad (3)$$

$$(1) \cap (3) \Rightarrow x < \frac{11}{4} \quad \underline{x=1, 2}$$

$$f(x) = (n-1)|x| = \begin{cases} x(n-1) & x \geq 0 \\ x(1-n) & x < 0 \end{cases} \quad f'(x) = \begin{cases} n-1 & x > 0 \\ 1-n & x < 0 \end{cases}$$

تابع f در بازه $(\frac{1}{2}, 1)$ اکسید نریزه است - بنابراین

$$a+b = \frac{1}{2} \quad \leftarrow a=0, b = \frac{1}{2}$$

$$f(1) = \frac{2}{3} \Rightarrow 1 + C \times 3^a = \frac{2}{3} \Rightarrow C \times 3^a = -\frac{1}{3} \quad \text{--- 116}$$

$$f(1) = 0 \Rightarrow 1 + C \times 3^{a+b} = 0 \Rightarrow C \times 3^{a+b} = -1$$

$$3^b = 3^1 \rightarrow b = 1$$

$$f(-1) = 1 + C \times 3^{a-b}$$

$$= 1 + \frac{1}{3} \times \underbrace{C \times 3^a}_{-\frac{1}{3}} = 1 - \frac{1}{9} = \frac{8}{9}$$

--- 117

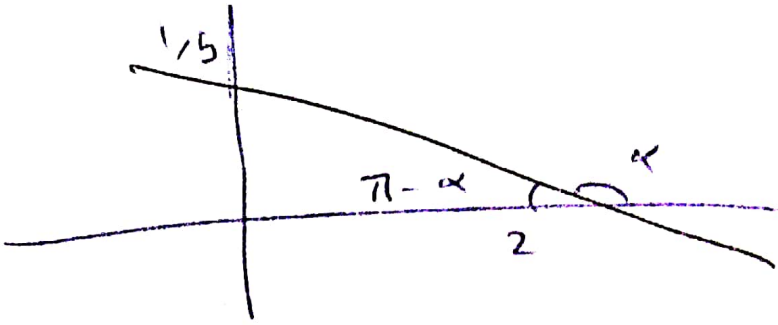
$$f(n) = \frac{n+2}{4} - \frac{\sqrt{n+1}}{2} \quad n=3$$

$$f(3) = \frac{5}{4} - 1 = \frac{1}{4}$$

$$f^{-1}\left(\frac{1}{4}\right) = 3 \Rightarrow \frac{a}{4} + \frac{a}{2} = 3$$

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

4/118



$$\tan(\pi - \alpha) = -\tan \alpha = \frac{1/5}{2} = \frac{3}{4}$$

$$\Rightarrow \tan \alpha = -\frac{3}{4}$$

$$\tan\left(\frac{\pi}{2} - \alpha\right) = \cot \alpha = -\frac{4}{3}$$

4/119

$$\frac{3 \cos(180 + 68) + 2 \sin(90 + 68)}{\sin(270 - 68) - \cos(360 - 68)}$$

$$= \frac{-3 \cos 68 - 2 \cos 68}{-\cos 68 - \cos 68} = \frac{5}{2} = 2,5$$

$$= \frac{-3 \cos 68 - 2 \cos 68}{-\cos 68 - \cos 68} = \frac{5}{2} = 2,5$$

4/120

$$\sin \pi - 4 \sin^2 \pi \cos \pi = 0 \Rightarrow \sin \pi \cos \pi (1 - 4 \sin \pi) = 0$$

 $\sin \pi \cos \pi$

$$\left\{ \begin{array}{l} \sin \pi = 0 \quad \xrightarrow{[-\pi, \pi]} \quad \pi = 0 \end{array} \right.$$

$$\cos \pi = 0 \quad \xrightarrow{[-\pi, \pi]} \quad \pi = -\frac{\pi}{2}, \frac{\pi}{2}$$

$$\sin \pi = \frac{1}{2} \quad \xrightarrow{[-\pi, \pi]} \quad \pi = \frac{\pi}{6}, \frac{5\pi}{6}$$

15 (121)

$$y = 1 + \sin ax \xrightarrow{a < 0} T = \frac{2\pi}{|a|} = \pi$$

$$|a| = 2 \xrightarrow{a < 0} a = -2$$

$$y = 3 \cos\left(\frac{\pi}{a}x\right) \rightarrow T = \frac{2\pi}{|\frac{1}{a}|} = |a|(2\pi) = 4\pi$$

35 (122)

$$\textcircled{A} \quad \lim_{x \rightarrow 1^+} (f+g)(x) = -$$

$$\textcircled{B} \quad \lim_{x \rightarrow 1^-} (f+g)(x) = 1$$

$$\textcircled{C} \quad \lim_{x \rightarrow 1^+} (f-g)(x) = 5$$

$$\textcircled{D} \quad \lim_{x \rightarrow 1^-} (f-g)(x) = 3$$

$$\textcircled{A, C} \Rightarrow \lim_{x \rightarrow 1^+} (f+g)(x) + \lim_{x \rightarrow 1^+} (f-g)(x) = 2 \lim_{x \rightarrow 1^+} f(x) = 5$$

$$\Rightarrow \lim_{x \rightarrow 1^+} f(x) = 2,5$$

$$\textcircled{B, D} \Rightarrow \lim_{x \rightarrow 1^-} (f+g)(x) + \lim_{x \rightarrow 1^-} (f-g)(x) = 2 \lim_{x \rightarrow 1^-} f(x) = 5$$

$$\Rightarrow \lim_{x \rightarrow 1^-} f(x) = 2,5$$

E) (123)

$$\lim_{n \rightarrow \frac{1}{2}^+} \frac{a + 3[-n]}{1 - 2n} = \lim_{n \rightarrow \frac{1}{2}^+} \frac{a - 3}{1 - 2n} = -\infty$$

$$\Rightarrow a - 3 > 0 \Rightarrow a > 3 \rightarrow 0 < \frac{1}{a} < \frac{1}{3}$$

$$\text{With } a = 4 \Rightarrow \lim_{n \rightarrow \frac{1}{2}} \left[\frac{n}{4} - n \right] = \lim_{n \rightarrow \frac{1}{2}} \left[\frac{n}{4} - n \right]$$

$$= \lim_{n \rightarrow \frac{1}{2}} \left[-\frac{3n}{4} \right] = \left[-\frac{3}{8} \right] = -1$$

" (124)

$$f(x) = b[x(x-a)] - 2a \quad \xrightarrow{\text{Rolle's}} \quad \text{---}$$

$$b = 0 \Rightarrow \frac{a}{f(b)} = \frac{a}{f(0)} = \frac{a}{-2a} = -\frac{1}{2}$$

~~3x-1~~

$$7y - x = 5 \Rightarrow y = \frac{1}{7}(x+5)$$

$$\frac{ax-1}{3x+1} = \frac{1}{7}(x+5) \Rightarrow (3x+1)(x+5) = 7(ax-1)$$

$$\Rightarrow 3x^2 + 16x + 5 = 7ax - 7$$

$$\Rightarrow 3x^2 + x(16-7a) + 12 = 0 \quad \xrightarrow{\Delta=0}$$

$$\Delta = (16-7a)^2 - (12)^2 = 0$$

$$\Rightarrow (16-7a) = \pm 12 \Rightarrow$$

$$\left\{ \begin{array}{l} 16-7a=12 \Rightarrow a = \frac{4}{7} \\ 16-7a=-12 \Rightarrow a = \frac{4}{7} \end{array} \right.$$

$$\left\{ \begin{array}{l} 16-7a=12 \Rightarrow a = \frac{4}{7} \\ 16-7a=-12 \Rightarrow a = \frac{4}{7} \end{array} \right.$$

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$$f(x) = (x^2 + 1)^3 (ax + 1)$$

افضل صوره: $\frac{f(0) - f(-1)}{0 - (-1)} = -11 \Rightarrow \frac{1 - 8(-a+1)}{1} = -11$

$$a = -\frac{1}{2}$$

$$f'(x) = 3(2x)(x^2 + 1)^2 (ax + 1) + a(x^2 + 1)^3$$

$$\frac{x = -2a}{x = -\frac{1}{2}} \rightarrow x = 1: f'(1) = 3(2)(4)\left(-\frac{1}{2} + 1\right) + \left(-\frac{1}{2}\right)(8) = 8 \checkmark$$

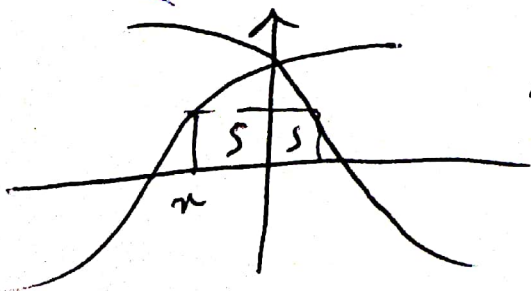
$$y = x^3 - 12x + 2 \rightarrow y' = 3x^2 - 12 = 0 \rightarrow x = \pm 2$$

127

$$f(2) = 8 - 24 + 2 = -14 = y_{\min}$$

$$f(-2) = -8 + 24 + 2 = 18 = y_{\max}$$

	-	+	-	+
y	+	+	-	+



$$S = xy = x \sqrt[3]{x+4}$$

$$S' = 1 \cdot \sqrt[3]{x+4} + \frac{1}{3\sqrt[3]{(x+4)^2}} (x) = 0$$

$$\Rightarrow \sqrt[3]{x+4} = \frac{-x}{3\sqrt[3]{(x+4)^2}} \Rightarrow 3(x+4) = -x \Rightarrow x = -3$$

$$y = 1$$

$$S = (xy) \Rightarrow S = 3$$

$$S_T = 6 \checkmark$$

$$1, 3, 9, 18, 23, 23, 39, 42, 2a+1 \quad \Sigma \quad 129$$

\downarrow \downarrow
 a_1 a_3

$$18 + 23 + 23 + a + a = 26 \Rightarrow a = 33$$

$$\frac{42 + (2a+1)}{2} = \frac{42 + 67}{2} = \frac{109}{2} = 54, 5$$

$$n = 1, 1, 5$$

$$3 \overline{) 130}$$

$$3! \times 4! = 144$$

$$(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 2), (3, 3)$$

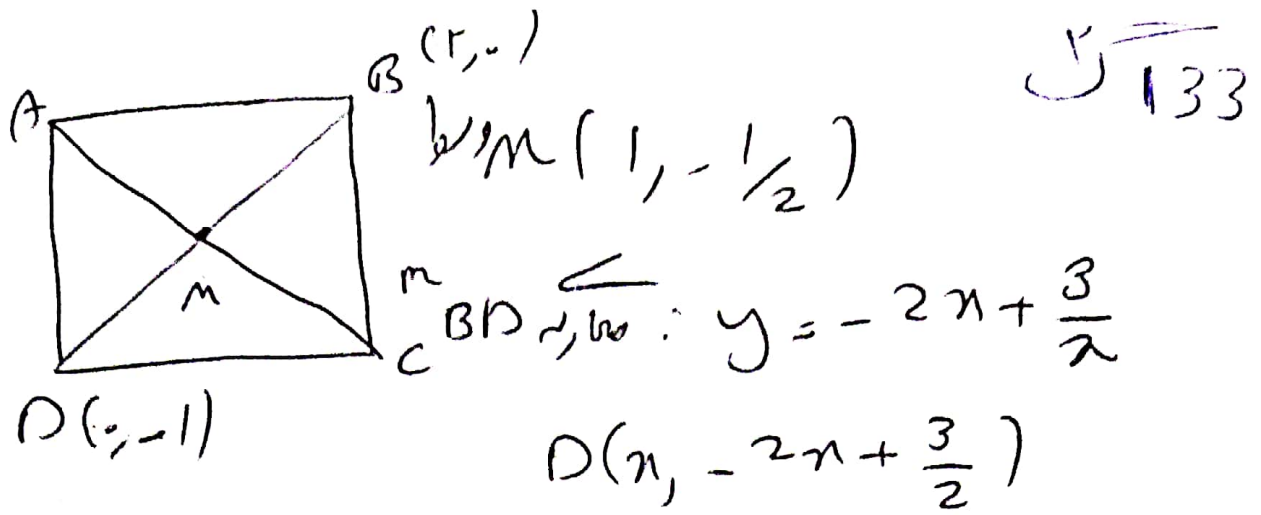
$$r \overline{) 144}$$

$$(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 2), (3, 3)$$

$$P(A) = \frac{20}{36} = \frac{5}{9}$$

Blue	$\frac{6}{15} \times \frac{6}{15}$	$\Rightarrow P = \frac{36 + 20 + 25}{15 \times 15} = \frac{2}{3}$	$\frac{1}{4} \overline{) 144}$
Green	$\frac{4}{15} \times \frac{5}{15}$		
Red	$\frac{5}{15} \times \frac{5}{15}$		

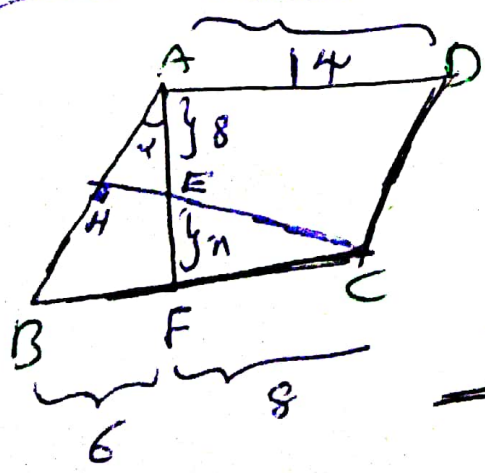
$= 0,36$



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

$$m_{AC} = \frac{0 - (-1)}{r - 0} = \frac{1}{r}$$

$$\Rightarrow x = \frac{3}{2} \Rightarrow \underline{D(\frac{3}{2}, -\frac{3}{2})}$$



$$\frac{x}{6} = \frac{8}{8+x}$$

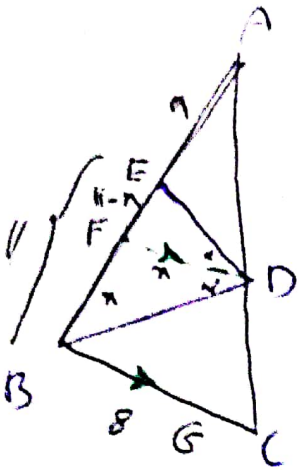
$$\Rightarrow x^2 + 8x = 48$$

$$x^2 + 8x - 48 = 0$$

$$(x+12)(x-4) = 0$$

$$\begin{cases} x = -12 \\ x = 4 \end{cases}$$

$x = 4$



135

$$DF = DG \Rightarrow \alpha = 45^\circ \rightarrow \alpha = 11 - \alpha$$

$$\alpha = 5,5$$

$$\text{سوی قوس: } \frac{a + 5,5}{a + 11} = \frac{5,5}{8}$$

$$\Rightarrow 2,5a = 16,5$$

$$\underline{a = 6,6}$$

m_{AC} =

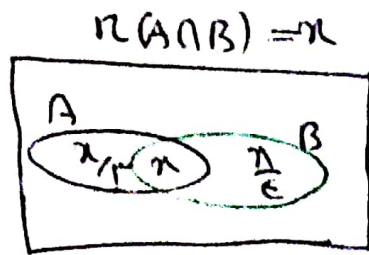
$$B = \frac{\frac{2}{\sqrt{2}} + \sqrt{14}}{\frac{8}{\sqrt{2}} + \sqrt{14}} = \frac{\sqrt{2} + \sqrt{14}}{4\sqrt{2} + \sqrt{14}}$$

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$$= \frac{\sqrt{2}(1 + \sqrt{7})}{\sqrt{2}(4 + \sqrt{7})} = \frac{\sqrt{7} + 1}{\sqrt{7} + 4} \xrightarrow{\text{L}} \frac{\sqrt{7} - 4}{\sqrt{7} - 4}$$

$$= \frac{3 - 3\sqrt{7}}{-9} = \frac{\sqrt{7} - 1}{3} \Rightarrow 3B + 1 = \sqrt{7}$$

B



5 | 137

$$\Rightarrow \frac{x}{3} + x + \frac{x}{\varepsilon} = 57$$

$$\Rightarrow \frac{19x}{12} = 57 \Rightarrow x = 36$$

$$n(A) = \frac{x}{3} + x \xrightarrow{x=36} n(A) = 48$$

دیسر حساب اول $\rightarrow a_1, a_1 + d$

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دیسر حساب دوم $\rightarrow a_1 + 4, a_1 + d + 4$

$$n \text{ اختلاف} = (a_1 + 4) - a_1 = 4$$

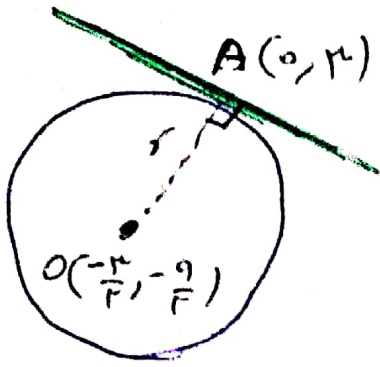
$$f(x) = \begin{cases} \sqrt{ax^2 + 3} + 2a & |x| \leq 1 \xrightarrow{x=1} 2 + 2a \\ ax^2 + 5 & |x| > 1 \xrightarrow{x=1} a + 5 \end{cases}$$

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$$2 + 2a = a + 5$$

$$\boxed{a = 3}$$

$$f(a) = f(3) = 3(3)^2 + 5 = \underline{\underline{32}}$$



$$3y + 2x - 9 = 0 \quad \text{سبب} \quad -\frac{2}{3}$$

$$m_{OA} = \frac{3 + \frac{9}{2}}{\frac{3}{2}} = \frac{6 + 9}{3} \xrightarrow{\text{مرد}} m_{\perp A} = \frac{3}{2}$$

$$\Rightarrow \frac{6+9}{3} = \frac{3}{2} \Rightarrow 9 = 12 + 2a$$

$$a \Rightarrow -\frac{3}{2}$$

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