

101 #4

$$(d^2 + \beta^2 - d\beta)(d^2 + \beta^2 + d\beta) \stackrel{\text{تفاضل و جمع}}{=} (d^2 + \beta^2)^2 - d^2\beta^2$$

$$\frac{d^4 + \beta^4 + 2d^2\beta^2 - d^2\beta^2}{d^2\beta^2} = (3\sqrt{2}-4) + (3\sqrt{2}+4) + \sqrt[4]{18-16}$$

$$= 6\sqrt{2} + \sqrt{2} = 7\sqrt{2}$$

102 #4

$$\frac{12}{m-2} > 0 \Rightarrow m-2 > 0 \Rightarrow m > 2$$

$$\boxed{m > 2}$$

$$\begin{cases} \frac{c}{a} > 0 \\ -\frac{b}{a} < 0 \\ \Delta > 0 \end{cases}$$

$$\frac{2(m+1)}{m-2} < 0 \Rightarrow m < -1$$

شرط عدم

نیازی به بررسی شرط $\Delta > 0$ نیست (در شرط عدم اشتراک دو دایره)

103 #2

$$f(x) = \frac{ax+b}{3} = 3$$

$$\frac{ax+b}{3} = \frac{-2x}{3}$$

$$ax+b = -2x$$

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

$$x = -1 \Rightarrow \boxed{-a+b=2}$$

$$f\left(\frac{1}{9}\right) = \frac{1}{9} = 3 = 3 \Rightarrow \frac{2a+b}{9} = 3 \Rightarrow \boxed{2a+b=-2}$$

$$\begin{cases} 2a+b=-2 \\ -a+b=2 \end{cases}$$

$$\boxed{b=1}$$

$$\boxed{a=-1}$$

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

$$f^{-1}(27) = m$$

$$\downarrow$$

$$f(m) = 27$$

$$\frac{-m+1}{3} = 27 = 3 \Rightarrow -m+1 = 3$$

$$-m+1 = 3$$

$$\boxed{m=-2}$$

$$\boxed{f^{-1}(27) = -2}$$

Shamsi
کامران حسینی فرد

104 #4

$$T = \frac{13\pi}{18} - \frac{\pi}{18} = \frac{2\pi}{3} = \frac{2\pi}{b} \Rightarrow \boxed{b=3}$$

$$A \Big|_{\frac{\pi}{18}}^{\frac{\pi}{18}} \in f(a) \quad 0 = a - 2 \cos\left(\frac{3\pi}{18} + \frac{\pi}{2}\right) = a + 2 \sin\left(\frac{\pi}{6}\right)$$

$$a + 1 = 0$$

$$\boxed{a = -1}$$

$$\Rightarrow \boxed{a+b=2}$$

(2)

105 #2

$$\begin{array}{r} \cancel{ax^3} + 4x^2 - 14x + 10 - a \quad \Big| \quad \begin{array}{l} x^2 - 2x + 1 \\ \hline ax + (4+2a) \end{array} \\ - \cancel{ax^3} + 2ax^2 + ax \\ \hline (4+2a)x^2 - (14+a)x + 10 - a \\ - \cancel{(4+2a)x^2} + 2(4+2a)x + (4+2a) \\ \hline (-6+3a)x + (6-3a) \end{array}$$

$$\begin{cases} -6+3a=0 \\ 6-3a=0 \end{cases} \Rightarrow \boxed{a=2}$$

Konkur
Sole & Partners

106 #3

$$\begin{cases} \sqrt{3x+4} > x-2 & x \geq 1 \\ \sqrt{3x+4} > -3x+2 & x < 1 \end{cases} \Rightarrow \begin{cases} 3x+4 > x^2-4x+4 \\ 3x+4 > 9x^2-12x+4 \end{cases}$$

$$\begin{cases} x^2-7x < 0 & x \geq 1 \\ 9x^2-15x < 0 & x < 1 \end{cases} \Rightarrow \begin{cases} 0 < x < 7, x \geq 1 \Rightarrow 1 \leq x < 7 \\ 0 < x < \frac{5}{3}, x < 1 \Rightarrow 0 < x < \frac{5}{3} \end{cases}$$

$$\therefore 0 < x < 7$$

$$\frac{a+b}{2} = \frac{0+7}{2} = \frac{7}{2}$$

Konkur
Sole & Partners

107 #1

$$1 - \log(x^2 - 3x) \geq 0 \Rightarrow \log x^2 - 3x \leq 1$$

$$x^2 - 3x \leq 10$$

$$x^2 - 3x - 10 \leq 0$$

$$(x+2)(x-5) \leq 0$$

$$-2 \leq x \leq 5$$

$$x^2 - 3x > 0$$

$$\begin{cases} x > 3 \\ x < 0 \end{cases}$$

البته با شرط آنجا

$$-2 < x < 0 \cup 3 < x \leq 5$$

$$[-2, 0) \cup (3, 5]$$

108 #3

$$\sin 4x = (\sin^2 x - \cos^2 x)(\sin^2 x + \cos^2 x)$$

$$\sin 4x = -\cos 2x$$

$$2 \sin 2x \cos 2x + \cos 2x = 0$$

$$\cos 2x (2 \sin 2x + 1) = 0$$

$$\begin{cases} \cos 2x = 0 \\ \sin^2 2x = -\frac{1}{2} \end{cases}$$

$$x = k\pi \pm \frac{\pi}{4}$$

$$\begin{cases} x = k\pi + \frac{7\pi}{12} \\ x = k\pi - \frac{\pi}{12} \end{cases}$$

Hasani
کتابخانه مستند

$$x_1 = \frac{\pi}{4}$$

$$x_3 = \frac{7\pi}{12}$$

$$x_2 = \frac{3\pi}{4}$$

$$x_4 = \frac{11\pi}{12}$$

$$\Rightarrow \sum x_i = \pi + \frac{18\pi}{12} = 2\pi + \frac{\pi}{2} = \dots$$

109 #1

$$y = \cos^{-1}(\tan x)$$

$$mx = \cos^{-1}(\tan x) \Rightarrow$$

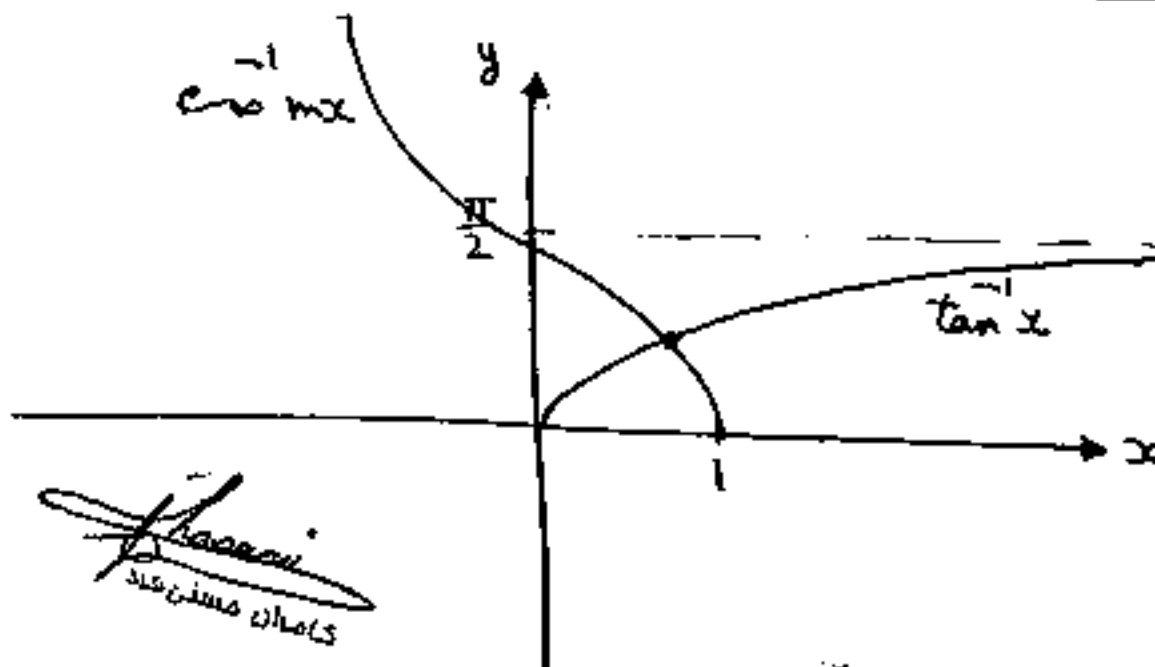
$$\cos^{-1} mx = \tan^{-1} x$$

$$y = mx$$

برای هر m می توانیم نقطه تقاطع را پیدا کنیم

$$m=0$$

$$(-\infty, +\infty) - \{0\}$$



110 #3

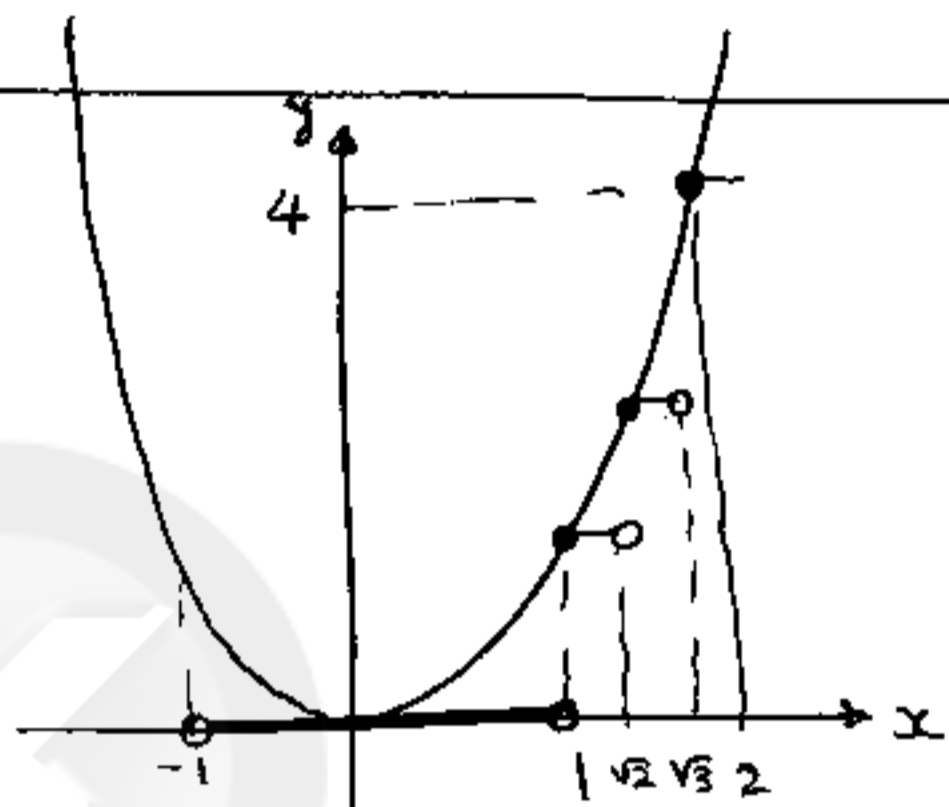
$$\lim_{x \rightarrow \frac{\pi}{3}^+} [\sin(x - \frac{\pi}{3})] \cos 3x + [\tan^2 x] = (x-1) + [(\sqrt{3})^2] = 3$$

$$\lim_{x \rightarrow \frac{\pi}{3}^-} [\sin(x - \frac{\pi}{3})] \cos 3x + [\tan^2 x] = (-1 \times -1) + [(\sqrt{3})^2] = 1 + 2 = 3$$

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111 #3

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$x = -1$, $x = 1$, $x = \sqrt{2}$, $x = \sqrt{3}$, $x = 2$
نقطه تا بیرون رفتن

112 #1

$$y = \left(\frac{m}{m+2}\right)x \quad \text{شیب} = \frac{m}{m+2}$$

$$y = \sqrt{1+x^2} \quad y' = f'(x_0) = \frac{x_0}{\sqrt{1+x_0^2}}$$

$$\frac{x_0}{\sqrt{1+x_0^2}} = \frac{m}{m+2}$$

برای اینکه موازی باشند
شیبها برابر باشند

$\frac{x_0}{\sqrt{1+x_0^2}} < 1$

همچنین اگر $m=0$ باشد $x_0=0$ جواب دریم پس $m=0$ جزو جواب است.
 $\frac{m}{m+2} < 1$ $\frac{m-m-2}{m+2} < 0$ $\frac{-2}{m+2} < 0$
 این نیزه اول درست است. $m+2 > 0$ $m > -2$

113 # 2

$$a_n = \left\{ \frac{n^2 + (-1)^n}{2n^2 + 2} \right\}$$

$$\lim_{n \rightarrow \infty} a_n = \frac{1}{2}$$

همگرایی
په لړزیده 2 3 درستی است.

$$n=1 \quad a_1 = \frac{1-1}{2+2} = 0$$

صورتی

$$n=2 \quad a_2 = \frac{4+1}{8+2} = \frac{5}{10}$$

په لړزیده 3 هم غلط است.

114 # 1

$$\lim_{x \rightarrow \infty} \frac{1}{x^2} (1 - x^2 \left[\frac{1}{x^2} \right]) = \lim_{x \rightarrow \infty} \frac{1}{x^2} - \left[\frac{1}{x^2} \right]$$

کامران مسعودی

$x \rightarrow \infty$

$x \rightarrow \infty$

وقتی $x \rightarrow \infty \iff \frac{1}{x^2} \rightarrow 0$ لږ تصدیق پرته از سوال است.

$$\lim_{x \rightarrow \infty} \frac{1}{x^2} - \frac{1}{x^2} = 0$$

115 # 1

$$\lim_{n \rightarrow \infty} \frac{2n+1}{3n+1} = \frac{2}{3}$$

که زیاد همگرایی است دینا راه نوزلی است و همرا.
گنباغی هرک بزرگترین برای اولین است.

116 # 1

$$y = \sqrt[3]{8x^3 + 2x^2} = 2 \left| x + \frac{2}{8x^3} \right| = 2x + \left(\frac{1}{6} \right)$$

کامران مسعودی

هم لږ زیاده

عرض لږ زیاده

117 # 4

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

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

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

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

تزیانی

$$f(x) = m$$

$$f(-x) = \frac{1}{m}$$

$$f^{-1}(m) = x$$

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

$$f^{-1}(m) + f^{-1}\left(\frac{1}{m}\right) = 0$$

118 #2 $f(x) = (x+2)e^{1-x}$ $\left. \begin{array}{l} x=1 \\ y=3 \end{array} \right\}$

$$m = f'(x_0) = e^{1-x} - (x+2)e^{1-x} \Rightarrow m = 1 - (1+2) = -2$$

$$y = -2x + 5$$

معادله خط مماس

$$\tan \alpha = \left| \frac{m - m'}{1 + mm'} \right| = \left| \frac{3 + 2}{1 - 6} \right| = 1$$

معادله خط مماس $y = 3x$

119 #3

$$y = 3x - 2 \quad \left. \begin{array}{l} \sqrt{x^2 - 4} \\ 4 \end{array} \right\}$$

$$m = f'(2) = 3$$

$$\lim_{x \rightarrow 2} \frac{f^2(x) - f(x)}{x-2} = \lim_{x \rightarrow 2} \frac{f(x)(f(x)-4)}{x-2} = \lim_{x \rightarrow 2} f(x) \cdot \lim_{x \rightarrow 2} \frac{f(x)-4}{x-2}$$

4 \times 3

$$= 12$$

120 #4

$$y = (5-x)x^{\frac{2}{3}} \quad y' = -x^{\frac{2}{3}} + \frac{2}{3}(5-x)x^{-\frac{1}{3}}$$

$$y'' = -\frac{2}{3}x^{-\frac{1}{3}} - \frac{2}{3}x^{-\frac{1}{3}} - \frac{2}{9}(5-x)x^{-\frac{4}{3}} = 0$$

$$x^{-\frac{1}{3}} \left(-\frac{4}{3} - \frac{2}{9}(5-x)x^{-1} \right) = 0 \quad \left(-\frac{4}{3} - \frac{2(5-x)}{9x} \right) = 0$$

$$\frac{-12x - 10 + 2x}{9x} = 0$$

$$-10x - 10 = 0$$

$$x = -1$$

121 #3

$$V = \frac{1}{3} \pi r^2 h = \frac{\pi}{3}$$

$$r^2 h = 1$$

$$r = \frac{1}{\sqrt{h}}$$

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$$S = \frac{\pi}{2} \times 2r \times l = \pi r \times \sqrt{h^2 + r^2}$$

$$S = \frac{\pi \sqrt{h^2 + \frac{1}{h}}}{\sqrt{h}} = \frac{\pi \sqrt{h^3 + 1}}{h}$$

$$S' = 0 \quad S' = \pi \left(\frac{\frac{3h^2 \times h}{2\sqrt{h^3+1}} - \sqrt{h^3+1}}{h^2} \right) = \frac{\pi}{h^2} \left(\frac{3h^3 - 2h^3 - 2}{2\sqrt{h^3+1}} \right) = 0$$

$$h^3 - 2 = 0 \quad h = \sqrt[3]{2}$$

122 #2

نکتہ برقرار ہے اس لیے صورت کمرے میں مضاعف کر دو۔

$C = 3$ جب تک کہ $x = -3$ راہی رہے شریخ $x = -3$ اتے ہے

$$y = \frac{x^2 + ax + b}{x + 3} \quad \begin{array}{r} x^2 + ax + b \\ x^2 + 3x \\ \hline (a-3)x + b \end{array} \quad \begin{array}{r} x+3 \\ \hline x+a-3 \end{array}$$

$$y = x + a - 3$$

$$A \mid 7 \Rightarrow 0 = 7 + a - 3 \quad a = -4 \Rightarrow b = 4$$

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123 #3

$$\frac{\int_2^4 \frac{x^2 - 2}{x^2} dx}{4-2} = \frac{\int_2^4 \left(1 - \frac{2}{x^2}\right) dx}{2} = \frac{1}{2} \left(x + \frac{2}{x} \right)$$

$$= \frac{1}{2} \left(4 + \frac{1}{2} \right) - \frac{1}{2} (2 + 1) = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$

Shamim
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(124 # 2)

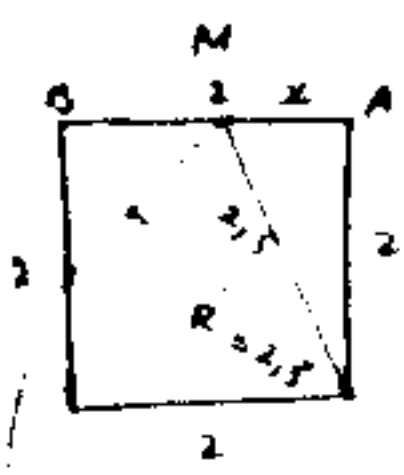
124 # 2

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{1 + \cos 2x}{2 \sin^2 x} dx = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{2 \cos^2 x}{2 \sin^2 x} dx = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cot^2 x dx$$

$$= (x - \cot x) \Big|_{\frac{\pi}{4}}^{\frac{\pi}{2}} = \left(\frac{\pi}{2} - 0\right) - \left(-\frac{\pi}{4} - 1\right) = 1 - \frac{\pi}{4}$$



125 # 2



$$x^2 + 4 = (2.5)^2$$

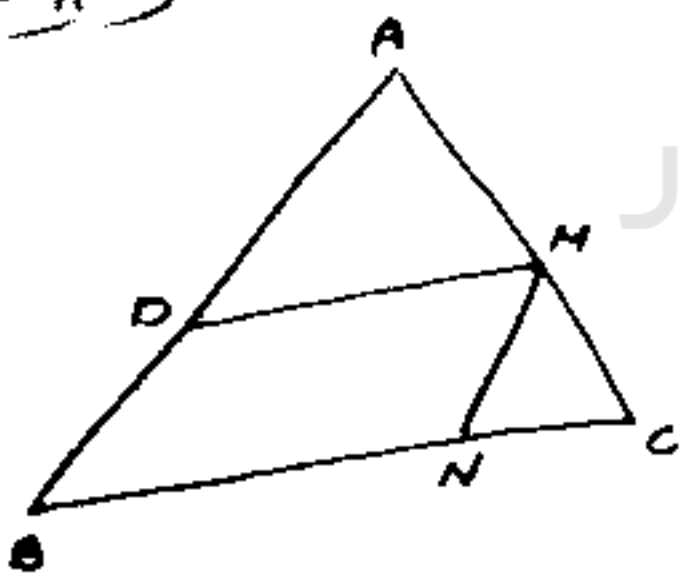
$$x^2 = 2.25$$

$$x = 1.5$$

$$BM = 2 - x = 2 - 1.5 = \frac{1}{2}$$



126 # 4



$$\frac{DA}{DB} = \frac{2}{3}$$

$$\frac{DA}{AC} = \frac{3}{5}$$

$$\frac{S_{\triangle DMN}}{S_{\triangle ABC}} = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

$$\frac{AD}{AB} = \frac{3}{5} = \frac{AM}{AC}$$

$$\frac{CM}{AC} = \frac{2}{5}$$

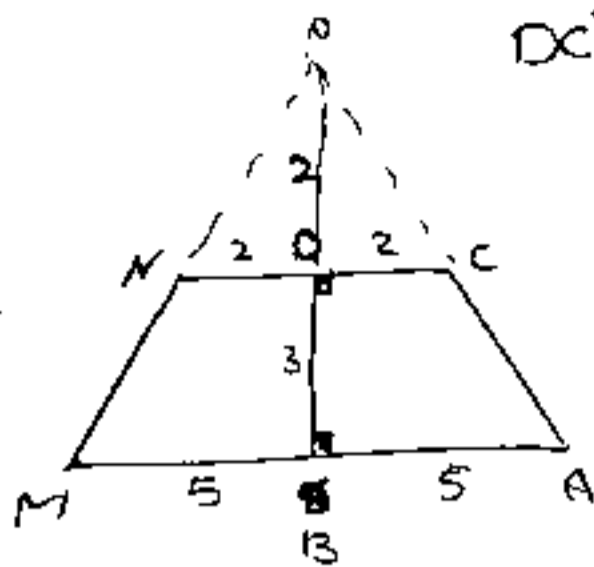
$$\frac{S_{\triangle DMN}}{S_{\triangle ABC}} = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$$

$$\frac{S_{DMNB}}{S_{\triangle ABC}} = \frac{S_{\triangle ABC} - S_{\triangle DMN} - S_{\triangle DMN}}{S_{\triangle ABC}} = 1 - \frac{9}{25} - \frac{4}{25} = \frac{12}{25}$$

1/25



127 # 3



$DC \parallel AB$

$$\frac{OD}{OB} = \frac{2}{5}$$

$$OD = \frac{2}{5} \times 5 = 2$$

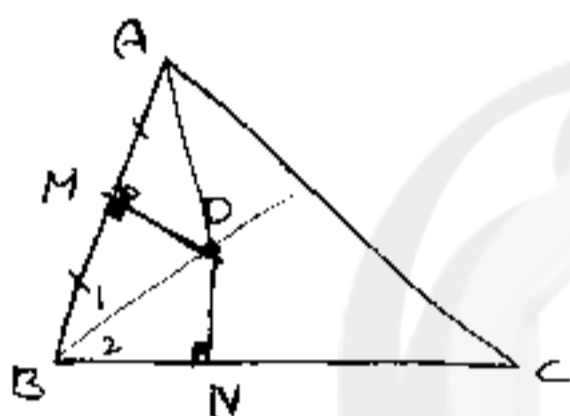
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$$V = V_{OAH} - V_{OCN}$$

$$V = \frac{1}{3} \pi (25 \times 5 - 4 \times 2) = \frac{\pi}{3} (125 - 8) = \dots$$

$$V = \frac{1}{3} \pi r^2 h$$

128 # 1



$$\triangle BMD \cong \triangle BDN$$

$$\triangle BMD \cong \triangle AMD$$

$$AM = BM = BN$$

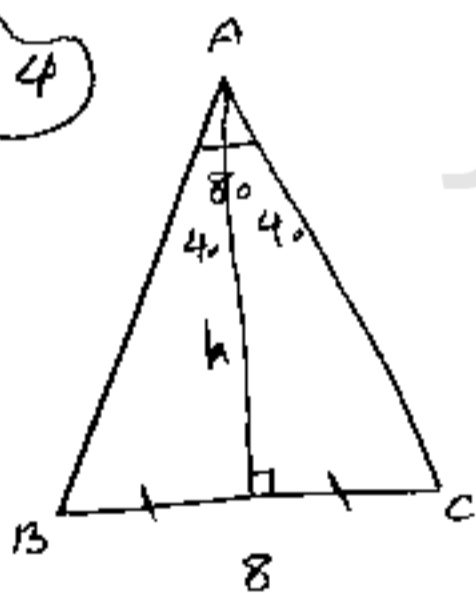
$$AB = 2BN$$

$$\hat{A} > \hat{C} \Rightarrow BC > AB$$

$$BN + NC > 2BN$$

$$BN < NC$$

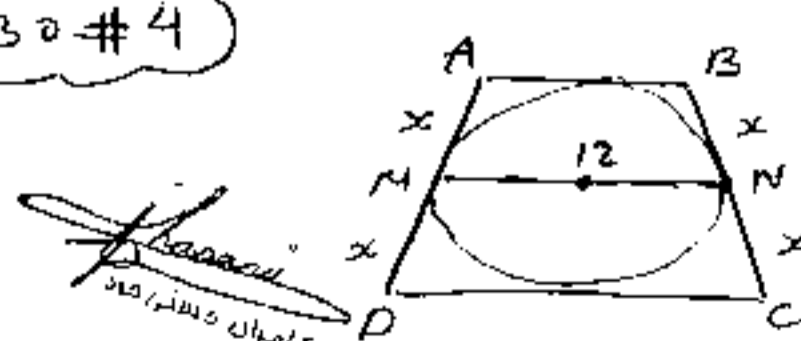
129 # 4



پس از آنکه ارتفاع را رسم کردیم متوجه شدیم که...

$$h = 4 \csc 40^\circ$$

130 # 4



پس از آنکه فرض کردیم شعاع دایره را r و طول اضلاع را x و y...

$$AD = BC \quad \frac{AB + DC}{2} = 12$$

$$AB + CD = 24$$

$$AB + CD = AD + BC$$

$$2P = 24 \times 2 = 48$$

131 # 2

$$3x + 2y = 6$$

$$T(x, y) = (-y, x) = (x', y')$$

$$-3y' + 2x' = -6$$

$$x' = x + 3$$

$$\Rightarrow -3(x' + 1) + 2(x' + 3) = -6$$

$$y' = y - 1$$

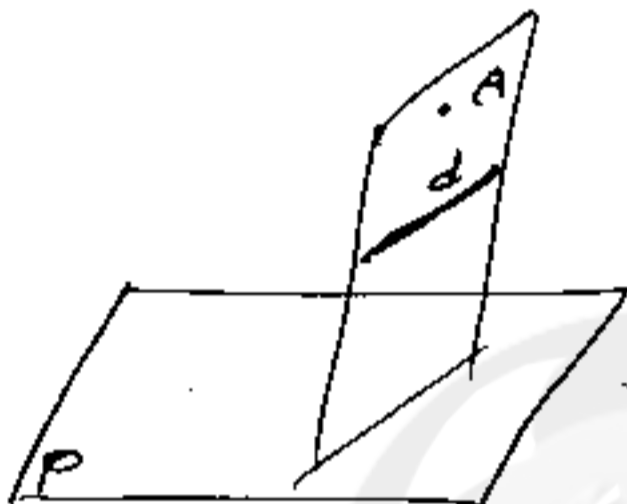
$$-3y' + 3 + 2x' + 6 = -6$$

$$3y' - 2x' = 15$$

امان علی فرد

132 # 1

امان علی فرد



توجه کنید که خط d خط $P \cap A$ است.

خط d و P موازی و $d \cap P \neq \emptyset$

برای صورت هر خطی از A تقاطع d رسم شود

و P را قطع خواهد کرد.

133 # 3

$$(a+b) \cdot (a-b) = 0 \Rightarrow |a| = |b|$$

$$|a| = |b| \Rightarrow \sqrt{9 + m^2 + 25} = \sqrt{(9 - 6m + m^2) + 49} \Rightarrow m = 4$$

$$\vec{a} \begin{vmatrix} 3 \\ 4 \\ 5 \end{vmatrix}$$

$$\vec{b} \begin{vmatrix} -1 \\ 7 \\ 0 \end{vmatrix}$$

$$\vec{a} \cdot \vec{b} = |a| \cdot |b| \cos \alpha$$

$$-3 + 28 = \sqrt{50} \times \sqrt{50} \cos \alpha$$

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

$$\alpha = 60^\circ$$

134 # 1

$$\vec{A} \begin{vmatrix} 3 \\ -2 \\ 1 \end{vmatrix}$$

$$\vec{u} \begin{vmatrix} 5 \\ -3 \\ 4 \end{vmatrix}$$

$$\vec{A} \times \vec{u} = \begin{vmatrix} 5 \\ 7 \\ -1 \end{vmatrix}$$

$$h = \frac{|\vec{A} \times \vec{u}|}{|\vec{u}|} = \frac{\sqrt{25 + 49 + 1}}{\sqrt{25 + 9 + 16}} = \frac{\sqrt{75}}{\sqrt{50}} = \sqrt{\frac{3}{2}} = \frac{\sqrt{6}}{2}$$

امان علی فرد

135 #1

$$\frac{x-1}{4} = \frac{y+2}{3} = \frac{z-3}{1} = t$$

$$\vec{A} \begin{vmatrix} 1 \\ -2 \\ 3 \end{vmatrix} \quad \vec{u} \begin{vmatrix} 0 \\ 0 \\ 1 \end{vmatrix}$$

$$h = \frac{|\vec{A} \times \vec{u}|}{|\vec{u}|}$$

$$\begin{cases} x = 4t + 1 \\ y = 3t - 2 \end{cases}$$

$$3 \text{ فاصله از محور } z = \sqrt{x^2 + y^2} = \sqrt{16t^2 + 8t + 1 + 9t^2 - 12t + 4}$$

$$h = \sqrt{25t^2 - 4t + 5}$$

برای اینکه کوچکترین فاصله باشد
زیر را صفر کنیم

$$50t - 4 = 0$$

$$t = \frac{2}{25}$$

$$h = \sqrt{\frac{4}{25} - \frac{8}{25} + \frac{125}{25}} = \sqrt{\frac{121}{25}} = \frac{11}{5} = 2,2$$

136 #3

$$0 \begin{vmatrix} \alpha \\ -\alpha \end{vmatrix}$$

برای اینکه بر هم برخورد کنند

$$R = \alpha$$

$$(x - \alpha)^2 + (y + \alpha)^2 = \alpha^2$$

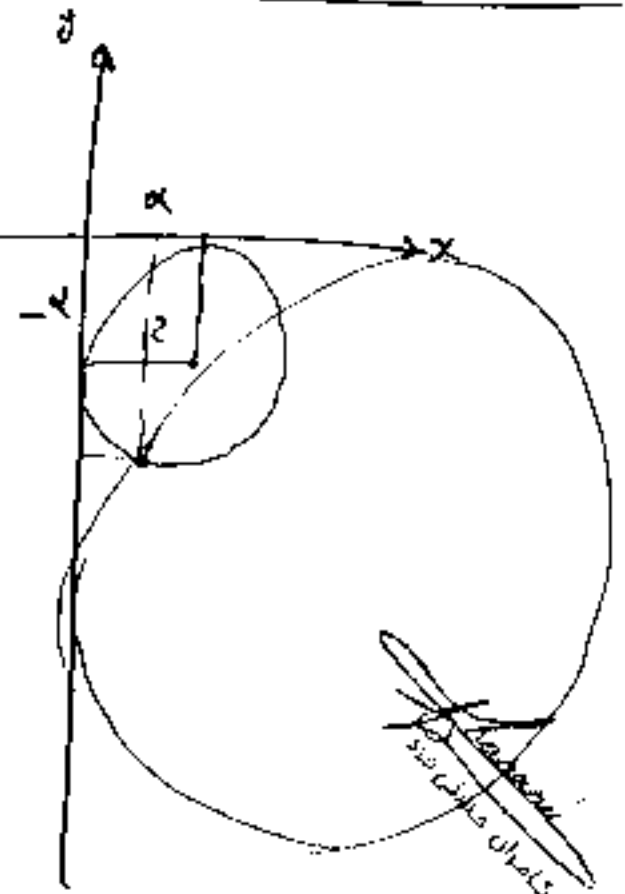
$$\begin{vmatrix} +2 \\ -9 \end{vmatrix}$$

$$(2 - \alpha)^2 + (-9 + \alpha)^2 = \alpha^2$$

$$\alpha^2 - 22\alpha + 85 = 0$$

$$(\alpha - 17)(\alpha - 5) = 0 \quad R = \alpha = 17 \quad \checkmark$$

$$R = \alpha = 5$$



فاصله مرکز از مبدأ برابر است

137 # 3

$$8x^2 - y^2 + 4y - 4 = 12 - 4$$

$$8x^2 - (y-2)^2 = 8$$

$$\frac{x^2}{1} - \frac{(y-2)^2}{8} = 1$$



$$b^2 = 8$$

$$b = 2\sqrt{2}$$

138 # 4

زاویه 60°

$$A = 2 \begin{bmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{bmatrix} = 2 R\left(\frac{\pi}{3}\right)$$



$$A^3 = 2^3 R\left(\frac{\pi}{3}\right)^3 = 8 R(\pi) \implies M = 8 \times \begin{bmatrix} +2 \\ -1 \end{bmatrix} = \begin{bmatrix} 16 \\ -8 \end{bmatrix}$$

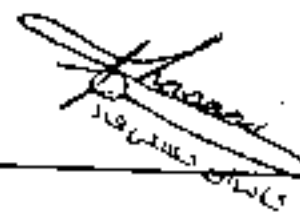
139 # 2

$$A \times (I - A) = I \implies A - A^2 = I \implies A^2 = A - I$$

طرفین را به توان 2 می‌رسانیم

$$A^4 = (A - I)^2 = A^2 - AI - IA + I = A^2 - 2A + I = (A - I) - 2A + I$$

$$A^4 = -A$$



140 # 4

$$\begin{cases} x + y - z = 7 \\ 4x - y + 5z = 3 \\ 6x + y + z = 17 \end{cases}$$

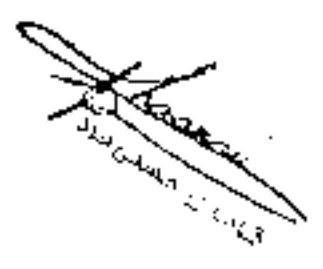
$z = x + y - 7$ در معادله 2 و 3 جایگزین می‌کنیم

$$\begin{cases} 4x - y + 5x + 5y - 35 = 3 \\ 6x + y + x + y - 7 = 17 \end{cases}$$

$$\begin{cases} 9x + 4y = 38 \\ 7x + 2y = 24 \end{cases}$$

از معادله 2

$$y = 5$$



141 # 4

$$\bar{x} = \frac{(2 \times 3) + (5 \times 7) + (7 \times 8) + (9 \times 5) + (11 \times 3)}{25} = \frac{175}{25} = 7$$

$$\sigma^2 = \frac{\sum f_i (x_i - \bar{x})^2}{n} = \frac{2 \times (3-7)^2 + 7 \times (5-7)^2 + 5 \times (8-7)^2 + 3 \times (11-7)^2}{25}$$

$$\sigma^2 = \frac{32 + 28 + 20 + 48}{25} = \frac{128}{25} = 5.12$$

142 # 1

$$x_i = 1, 2, 3, 4, 5$$

$$\bar{x} = 3$$

$$\sigma^2 = \frac{4 + 1 + 1 + 4}{5} = 2$$

$$\sigma_x = \sqrt{2}$$

$$\bar{u} = 12 \times 3 + 6 = 42$$

$$\sigma_u = 12 \times \sqrt{2} = 12\sqrt{2}$$

$$C.V. = \frac{12\sqrt{2}}{42} = \frac{2\sqrt{2}}{7} = \frac{2 \times 1.4}{7} = 0.4$$

143 # 4

$$1^3 + 2^3 + 3^3 + \dots + 19^3 = (1 + 2 + 3 + \dots + 19)^2$$

$$= \left(\frac{n(n+1)}{2} \right)^2$$

$$1^3 + 3^3 + 5^3 + \dots + 19^3 = 1^3 + 2^3 + 3^3 + \dots + 19^3 - (2^3 + 4^3 + 6^3 + \dots + 18^3)$$

$$= 1^3 + 2^3 + 3^3 + \dots + 19^3 - 2^3 (1^3 + 2^3 + \dots + 9^3)$$

$$= \left(\frac{19(1+19)}{2} \right)^2 - 2^3 \left(\frac{9(1+9)}{2} \right)^2 = (190)^2 - 8 \times (45)^2$$

$$= 36100 - 2 \times 8100 = 36100 - 16200 = 19900$$

اصل لانه گوتو و ايرين صلت ممکن اينست که در پرتاب 6 تاسها ابتدا تمام

144 # 2

اعداد مقدمات بهينه . بنابرین 12 بار لازم است تا تمام اعداد 1 تا 6 هر کدام 2 بار بهينه

در پرتاب 6 تاسها هر عدد 6 بار که ابتدا 6 بار اول بهينه است.

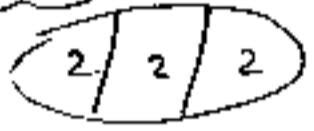
کامران گلشن فرد

145 # 2

$A \not\subseteq C \quad \{2\} \not\subseteq C$

کامران گلشن فرد

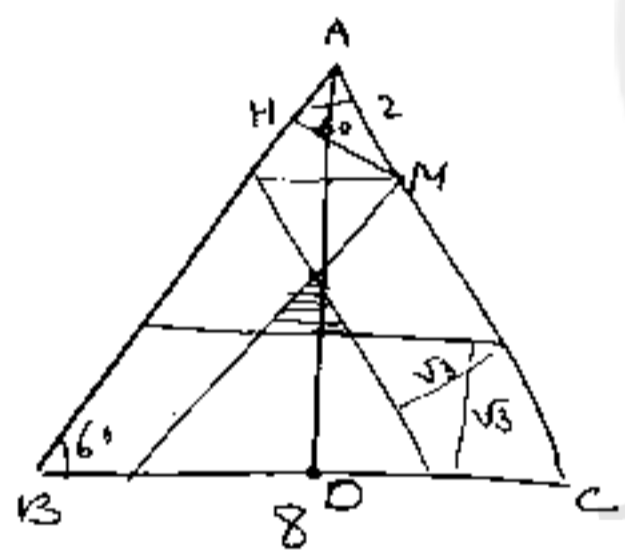
146 # 4



$$\frac{\binom{6}{2} \binom{4}{2} \binom{2}{2}}{6} = \frac{15 \times 6 \times 1}{6} = 15$$

147 # 1

خطوط موازي 3 ضلع رسم کنيم؛ بنابرین $\sqrt{3}$ از هر ضلع



در رئوس گوشه های پرتاب بهينه زاویه هر رئوس 60° است.

$MH = \sqrt{3} = AM \times \sin 60^\circ = \boxed{AM = 2}$

$AD = 8 \times \frac{\sqrt{3}}{2} = 4\sqrt{3}$

پس ارتفاع شش ها یکواضوعه $\sqrt{3}$ است.

$S = \sqrt{3}$

$S_{ABC} = 8 \times 8 \times \frac{\sqrt{3}}{4} = 16\sqrt{3}$

$P(A) = \frac{S_{ششها}}{S_{ABC}} = \frac{\sqrt{3}}{16\sqrt{3}} = \frac{1}{16}$

کامران گلشن فرد

148 # 2

$$P(A) = \frac{\binom{250}{6}}{250} = \frac{42}{250}$$

ضرب 6

$$P(B) = \frac{\binom{250}{7}}{250} = \frac{35}{250}$$

ضرب 7

$$P(A \cap B) = P(C) = \frac{6}{250}$$

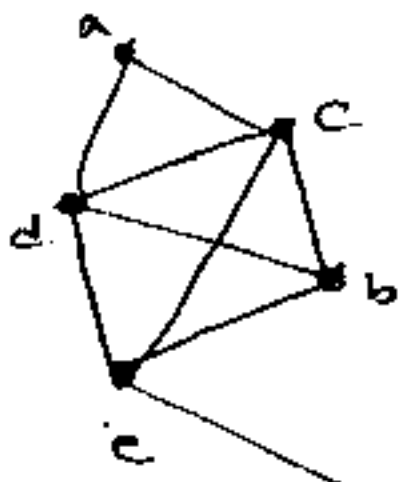
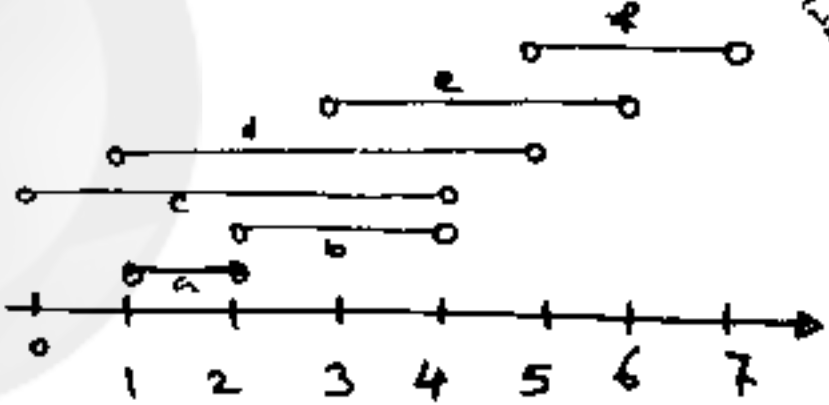
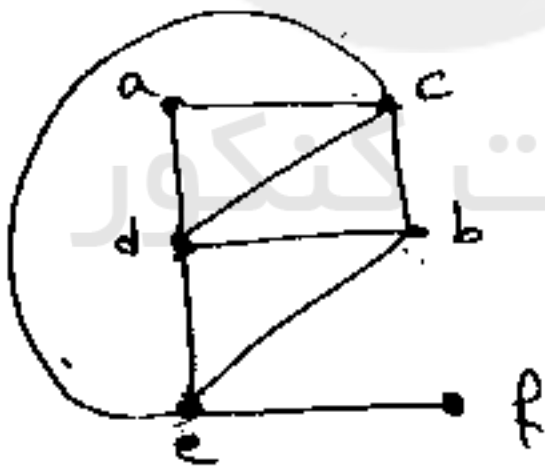
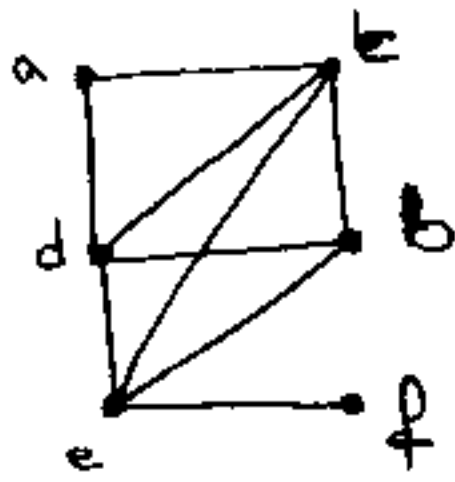
$$P(A \Delta B) = P(A \cup B) - P(A \cap B) = P(A) + P(B) - 2P(A \cap B)$$

$$= \frac{42 + 35 - 12}{250} = \frac{65}{250} = \frac{13}{50} = 0.26$$



149 # 4

- a = (1, 2) b = (2, 4) c = (0, 4) d = (1, 5)
- e = (3, 6) f = (5, 7)



- aceda
- dcbed
- a.cbda
- ecbde
- dbecd

5

150 # 2

$$\begin{array}{r} 4898 \\ (522)6 \\ - (1553)6 \\ \hline (3345)6 \end{array}$$



151 #1

$$n = 31q + 26$$

$$44q' - 31q = 26$$

$$n = 43q' + q' = 44q'$$

$$n \equiv 26$$

$$44q' \equiv 26$$

$$13q' \equiv 26$$

31q' باقی

$$q' \equiv 2$$



$$q' = 31k + 2$$

$$k = 1$$

$$q' = 33$$

$$n = 44 \times 33 = 1452$$

152 #2

$$221x + 357y = (221, 357)$$

$$221 = 13 \times 17$$

$$(221, 357) = 17$$

$$357 = 3 \times 7 \times 17$$

$$221x + 357y = 17$$

$$13x + 21y = 1$$

$$13x \equiv 1$$

$$-8x \equiv 20$$

$$2x \equiv 5 \equiv 26$$

$$x \equiv 13$$

$$x = 21k + 13$$

$$1 < x < 100$$



- k = 0
- k = 1
- k = 2
- k = 3
- k = 4

153 #4

چون طویل ترین کمانها و پاره‌های آنهاست

154 #1

سومین (کمان) کوچک

$$\frac{1}{8} \times \frac{5}{7} \times \frac{2}{6} = \frac{10}{56} = \frac{5}{28}$$



155 #4

$$P(A) = \frac{\binom{5}{3} + \binom{4}{3} + \binom{3}{3}}{\binom{10}{3}} = \frac{10 + 4 + 1}{220} = \frac{15}{220}$$

$$P(A) = \frac{205}{220} = \frac{41}{44}$$