



سایت ویژه ریاضیات www.riazisara.ir

درسنامه ها و جزوه های ریاضی

سوالات و پاسخنامه تشریحی کنکور

نمونه سوالات امتحانات ریاضی

نرم افزارهای ریاضیات

و...

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$$\pi < n < \frac{5\pi}{2}$$

ربع سوم

$$\sqrt{1 + \tan^2 n} \left(2 \sin^2 \frac{\pi}{2} - \sin^2 n \right) = ?$$

$$\sqrt{1 + \tan^2 n} = \sqrt{\frac{1}{\cos^2 n}} = \frac{1}{\cos n}$$

$$\sin \frac{\pi}{2} = \frac{\sqrt{2}}{2} \longrightarrow 2 \sin^2 \frac{\pi}{2} = 1 \Rightarrow 1 - \sin^2 n = \cos^2 n$$

$$\Rightarrow \frac{1}{\cos n} (\cos^2 n) = \underline{\underline{\cos n}}$$

• جواب در صورتی که ربع اول باشد $\pi < n < \frac{5\pi}{2}$

دوایا بالا اگر ربع اول بود درست است اما چون گفته $\pi < n < \frac{5\pi}{2}$ و ربع دوم سوم که $\sin$ و $\cos$ در آن منفی است بنابراین

$$\sqrt{1 + \tan^2 n} = \frac{-1}{\cos n}$$

$$\Rightarrow \frac{-1}{\cos n} (\cos^2 n) = \underline{\underline{-\cos n}} \quad \text{جواب}$$

$$\frac{1 \dots}{1 \dots + v} - \frac{1 \dots}{1 \dots - v} = \Delta \Rightarrow \frac{2 \dots}{1 \dots + v} - \frac{2 \dots}{1 \dots - v} = 1 \Rightarrow 4 \dots v = 1 \dots - v^2$$

$$\Rightarrow v^2 + 4 \dots v - 1 \dots = 0 \Rightarrow (v + \dots)(v - \dots) = 0 \Rightarrow v = -\dots \times$$

$v = \dots \checkmark$

$$\frac{\Delta n}{\Delta t} = v \Rightarrow \frac{\Delta n}{v} = \Delta t$$

$$1 < \frac{2n-3}{n+1} < 3$$

$$\frac{2n-3}{n+1} > 1 \Rightarrow \frac{2n-3}{n+1} - 1 > 0 \Rightarrow \frac{2n-3-n-1}{n+1} > 0 \Rightarrow \frac{n-4}{n+1} > 0$$

-1	4
-	+
+	+
+	+

$$\frac{2n-3}{n+1} < 3 \Rightarrow \frac{2n-3}{n+1} - 3 < 0 \Rightarrow \frac{2n-3-3n-3}{n+1} < 0 \Rightarrow \frac{-n-6}{n+1} < 0$$

-4	-1
+	-
-	+
-	-

$$((-\infty, -1) \cup (4, +\infty)) \cap ((-\infty, -4) \cup (-1, +\infty)) = (-\infty, -4) \cup (4, +\infty)$$

$R - [-4, 4]$

$$\binom{n}{4} + \binom{n}{2} + \binom{n}{0} = 2^n + 2^n + 2^n = 3 \cdot 2^n$$

$$ra + \sqrt{ra^2 + fa} = r$$

$$\frac{a+1}{a} = ?$$

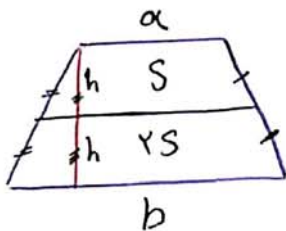
$$\sqrt{ra^2 + fa} = r - ra \longrightarrow r - ra \geq 0 \Rightarrow r \geq ra \Rightarrow a \leq \frac{r}{r}$$

$$\Rightarrow ra^2 + fa = r - 1ra + 9a^2$$

$$\Rightarrow 9a^2 - 14a + r = 0 \Rightarrow a = r \quad X$$

$$a = \frac{r}{9} \quad \checkmark$$

$$\frac{\frac{r}{9} + 1}{\frac{r}{9}} = \frac{\frac{r}{9}}{\frac{r}{9}} = \frac{r}{r} = 1$$

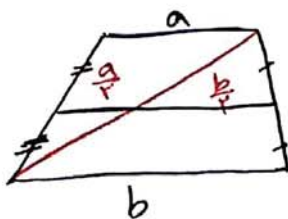


$$\Rightarrow \frac{S}{rS} = \frac{1}{r} = \frac{\frac{1}{r}(a + (\frac{a+b}{r}))h}{\frac{1}{r}(b + (\frac{a+b}{r}))h}$$

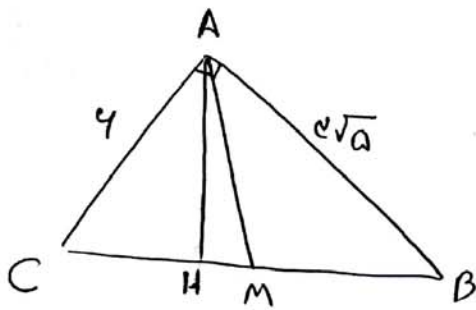
$$\Rightarrow ra + a + b = b + \frac{a+b}{r} \Rightarrow ra = \frac{a+b}{r}$$

$$\Rightarrow 9a = a + b \rightarrow 8a = b \Rightarrow \frac{a}{b} = \frac{1}{8}$$

$$\text{نسبت } \frac{a}{b} = \frac{a+b}{r}$$



$$\Rightarrow \frac{a}{r} + \frac{b}{r} = \frac{a+b}{r}$$



$$a^2 = b^2 + c^2 = 4^2 + 2^2 = 20$$

$$\Rightarrow a = \sqrt{20} = 2\sqrt{5}$$

$$\underline{BC = 9}$$

A جواب $AH \times BC = AB \times AC \Rightarrow AH \times 9 = 2\sqrt{5} \times 4 \Rightarrow AH = \frac{8\sqrt{5}}{9}$

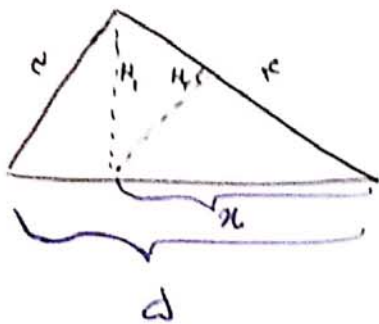
$$CH = \sqrt{4^2 - \left(\frac{8\sqrt{5}}{9}\right)^2} = \frac{16}{9}$$

$$CM = \frac{9}{5} = 1.8 \Rightarrow \underline{MH = \frac{1}{5}}$$

B جواب $AC^2 = CH \times BC \Rightarrow 16 = CH \times 9 \Rightarrow CH = \frac{16}{9}$

$$MH = CM - CH = \frac{9}{5} - \frac{16}{9} = \frac{1}{5}$$

$$\frac{S_{ABC}}{S_{AMH}} = \frac{\frac{1}{2} AH \times BC}{\frac{1}{2} AH \times MH} = \frac{9}{\frac{1}{5}} = \underline{\underline{45}}$$

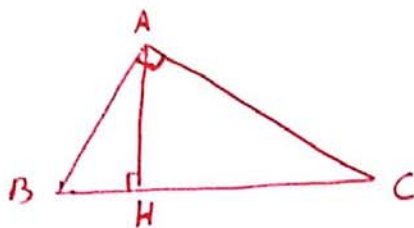


$$H_1 \times a = r \times \frac{r}{a} \Rightarrow H_1 = \frac{r^2}{a}$$

$$r^2 = a \times d \Rightarrow a = \frac{r^2}{d}$$

$$\frac{H_r}{H_1} = \frac{\frac{r^2}{a}}{\frac{r^2}{a}} = \frac{r}{a} \checkmark$$

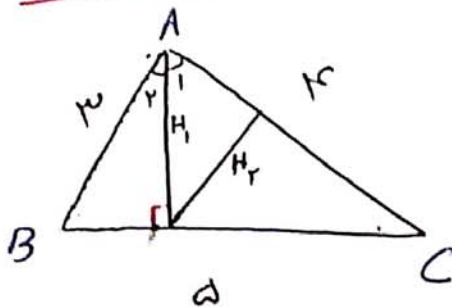
$$\frac{r^2}{a} \times \frac{r}{a} = H_r \times r \Rightarrow H_r = \frac{r}{a}$$



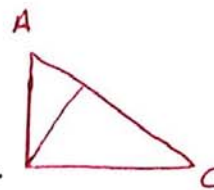
$$\begin{aligned} AB^2 &= BH \times BC \\ AC^2 &= CH \times BC \\ AB \times AC &= AH \times BC \end{aligned}$$

(نکته)

روش دوم



$$\begin{aligned} \text{در مثل } ABC \quad \sin C &= \frac{r}{a} \\ \sin A_1 &= \frac{H_r}{H_1} \end{aligned}$$



$$C + A_1 = 90^\circ \Rightarrow \begin{cases} \sin C = \cos A_1 \\ \cos C = \sin A_1 \end{cases} \star$$

$$\Rightarrow \sin A_1 = \frac{H_r}{H_1} = \cos C = \sqrt{1 - \sin^2 C} = \frac{r}{a}$$

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$$\sin\left(\frac{14\pi}{9}\right) \cos\left(\frac{-14\pi}{9}\right) + \tan\left(\frac{14\pi}{9}\right) \sin\left(\frac{-14\pi}{9}\right)$$

$$= \sin\left(\frac{14\pi - \pi}{9}\right) \cos\left(\frac{14\pi - \pi}{9}\right) + \tan\left(\frac{14\pi - \pi}{9}\right) \sin\left(\frac{14\pi - \pi}{9}\right)$$

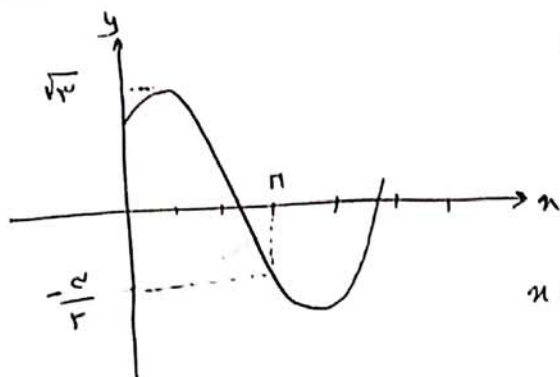
$$\cos(-\alpha) = \cos \alpha$$

$$\sin(-\alpha) = -\sin \alpha$$

$$= \sin\left(5\pi - \frac{\pi}{9}\right) \cos\left(5\pi - \frac{\pi}{9}\right) - \tan\left(5\pi - \frac{\pi}{9}\right) \sin\left(5\pi - \frac{\pi}{9}\right)$$

$$= \left(-\sin \frac{\pi}{9}\right) \left(-\cos \frac{\pi}{9}\right) - \left(-\tan \frac{\pi}{9}\right) \left(-\sin \frac{\pi}{9}\right)$$

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



$$y = a + b \sin\left(x + \frac{\pi}{6}\right)$$

$$x = \pi \Rightarrow -\frac{1}{2} = a + b \sin\left(\pi + \frac{\pi}{6}\right)$$

$$\Rightarrow -\frac{1}{2} = a + b \left(-\frac{\sqrt{3}}{2}\right) \Rightarrow \underline{2a - \sqrt{3}b = -1}$$

$$x = \frac{\pi}{6} \Rightarrow \sqrt{3} = a + b \sin\left(\frac{\pi}{6} + \frac{\pi}{6}\right)$$

$$\underline{\sqrt{3} = a + b}$$

$$\Rightarrow \begin{cases} a + b = \sqrt{3} \\ 2a - \sqrt{3}b = -1 \end{cases} \Rightarrow \begin{cases} -2a - 2b = -2\sqrt{3} \\ 2a - \sqrt{3}b = -1 \end{cases}$$

$$\underline{-2b - \sqrt{3}b = -2\sqrt{3} - 1} \Rightarrow b = \frac{2\sqrt{3} + 1}{2 + \sqrt{3}}$$

$$= \frac{\sqrt{3}(2 + \sqrt{3})}{2 + \sqrt{3}} = \underline{\underline{\sqrt{3}}}$$

$$\left(\frac{r}{a}\right)^{x-1} = \left(\frac{r}{a}\right)^{n^r} \rightarrow \log_{\frac{r}{a}}(n+1) = ?$$

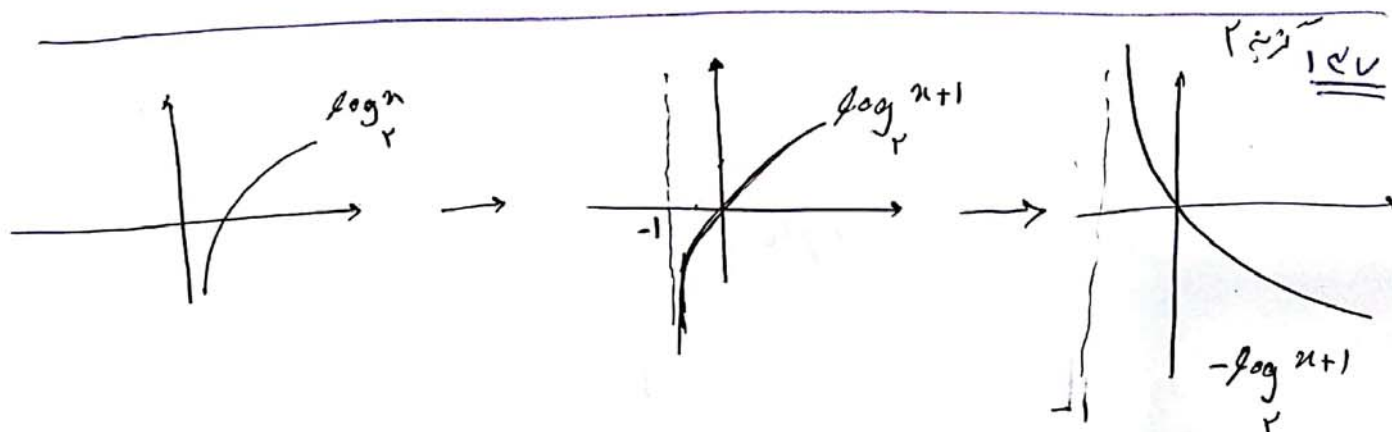
$$\left(\frac{r}{a}\right)^{r_{n-1}} = \left(\left(\frac{r}{a}\right)^{-r}\right)^{n^r} = \left(\frac{r}{a}\right)^{-r n^r}$$

$$\Rightarrow r_{n-1} = -r n^r \Rightarrow r n^r + r_{n-1} = 0 \Rightarrow (r_{n-1} + 1)(n+1) = 0$$

$$n+1 > 0$$

$$\begin{cases} n = -1 & \times \\ n = \frac{1}{r} & \checkmark \end{cases}$$

$$\log_{\frac{r}{a}}^r = \log_{\frac{r}{a}}^{\frac{r}{r}} = \frac{r}{r}$$



$$-\log_r^{n+1} = \log_r^{(n+1)^{-1}}$$

$$\begin{cases} \frac{1+n^3}{|n+2|} & n \neq -2 \\ a & n = -2 \end{cases}$$

۱۴۸ کریم ۱

از چپ می‌رسد $\lim_{n \rightarrow -2^-} f(n) = f(-2) = a$

$$\lim_{n \rightarrow -2^-} \frac{f(n)}{n} = \lim_{n \rightarrow -2^-} \frac{1+n^3}{-n-2} = \frac{0}{0} \xrightarrow{\text{hop}} \frac{3n^2}{-1} = \underline{\underline{-12}}$$

$$P(A) = 0.7$$

۱۴۹ کریم ۱

$$P(B) = 0.4$$

$$P(B|A) = 0.18 \Rightarrow P(B|A) = \frac{P(A \cap B)}{P(A)} \Rightarrow P(A \cap B) = 0.126$$

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

$$= 0.7 + 0.4 - 0.126 = \underline{\underline{0.974}}$$

گروه اول

۱۵۰ کریم ۲

$$\bar{x} = 10, \sigma^2 = 25 \Rightarrow CV_1 = \frac{5}{10} = \frac{1}{2}$$

گروه دوم

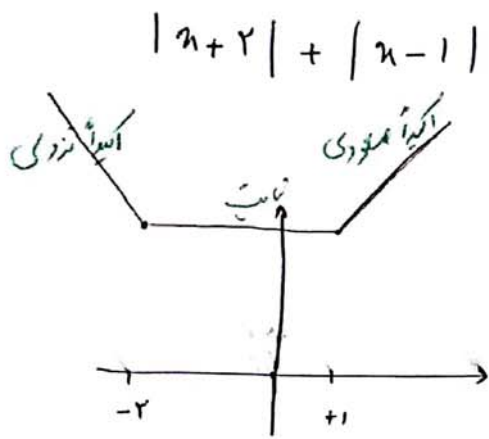
$$\bar{x} = 12, \sigma^2 = 14 \Rightarrow CV_2 = \frac{\sqrt{14}}{12} = \frac{1}{\sqrt{18}}$$

$$\frac{1}{\sqrt{18}} < \frac{1}{2}$$

CV ضریب تغییرات گروه دوم کمتر است بنابراین کار آنها بهتر است

گروه دوم

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کمیته نزدیک $(-\infty, -2)$

$$4 \sin x \sin \left(\frac{3\pi}{4} - x \right) = 1$$

$$\sin \left(\frac{3\pi}{4} - x \right) = -\cos x \Rightarrow -4 \sin x \cos x = 1$$

$$-2 \sin 2x = 1 \Rightarrow \sin 2x = -\frac{1}{2}$$

$$\begin{cases} 2x = 2k\pi - \frac{\pi}{6} \Rightarrow x = k\pi - \frac{\pi}{12} \\ 2x = 2k\pi + \pi + \frac{\pi}{6} \Rightarrow x = k\pi + \frac{7\pi}{12} \end{cases}$$

$$\rightarrow \pi - \frac{\pi}{12} + 2\pi - \frac{\pi}{12} + \frac{7\pi}{12} + \frac{19\pi}{12} = 2\pi$$

$$\frac{0}{0} \Rightarrow \frac{2n+10}{4 \times \frac{1}{3\sqrt{n^2}}} = \frac{-14+10}{4 \times \frac{1}{12}} = \frac{-4}{\frac{1}{3}} = -12$$

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

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

✓ $x \rightarrow \infty$ میل کند بزرگترین جمله را در نظر می‌گیریم
 ✓ اگر $x \rightarrow 0$ میل کند کوچکترین جمله را در نظر می‌گیریم
 ✗ برای $x < 0$ تعریف نشده است

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

$$x \rightarrow -\infty \quad 2x + \sqrt{4x^2 + x} = 2x - 2x - \frac{1}{2} = -\frac{1}{2}$$

$$\sqrt{ax^2 + bx + c} \approx \sqrt{a} \left| x + \frac{b}{2a} \right|$$

$$x \rightarrow \infty$$

$$f'(x) = \frac{\frac{1}{2\sqrt{x}}(a - 2x) + 2(1 + \sqrt{x})}{(a - 2x)^2} = \frac{-\frac{x}{2} + 6}{9} = \frac{x}{12}$$

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$$\begin{cases} \frac{1}{n-1} & n \geq 2 \\ -n^2 + an + b & n < 2 \end{cases}$$

✓ 147

مشتق در $n=2$ برابر است

$$\Rightarrow -4 + 2a + b = 1 \Rightarrow -4 + 4 + b = 1 \Rightarrow \underline{b = -1}$$

$$f'_+(2) = \frac{-1}{(n-1)^2} = -1$$

$$f'_-(2) = -2n + a = -4 + a \Rightarrow \underline{a = 3}$$

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

✓ 148

$$(f \circ g)'(2) = 4$$

$$f'(a) = ?$$

$$(f \circ g)'(n) = g'(n) f'(g(n))$$

$$4 = (-3) f'(a) \Rightarrow \underline{f'(a) = -\frac{4}{3}}$$

$$g'(n) = \frac{2(n-1) - (2n+1)}{(n-1)^2} \Rightarrow g'(2) = -3$$

$$g(2) = a$$

$$\frac{f(\varepsilon) - f(1)}{\varepsilon - 1} = \frac{\frac{1}{\varepsilon} - (-\frac{1}{1})}{\varepsilon - 1} = \frac{\frac{1}{\varepsilon} + 1}{\varepsilon - 1} = \frac{1 + \varepsilon}{\varepsilon(\varepsilon - 1)} = \frac{11}{\varepsilon}$$

✓ 149

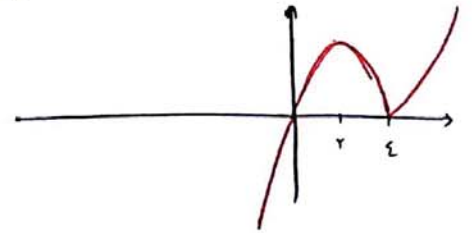
$$f'(2) = 2 + \frac{1}{2^2} = 2 + \frac{1}{4} = \frac{9}{4}$$

$$\Rightarrow \frac{11}{\varepsilon} - \frac{9}{4} = \frac{1}{\varepsilon} \Rightarrow \underline{\underline{\varepsilon = 10}}$$

$$f(n) = n/|n-4| = \begin{cases} n^2-4n & n \geq 4 \\ -n^2+4n & n < 4 \end{cases}$$

۴۵/۱۵۰

$$\rightarrow \begin{cases} 2n-4 & n \geq 2 \\ -2n+4 & n < 2 \end{cases}$$

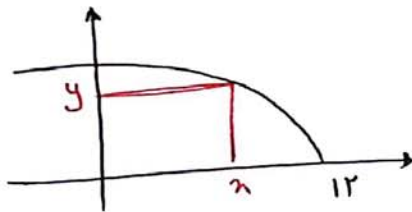


نقطه بحرانی ۲، ۴ $\Rightarrow n=2 \rightarrow 4 \Rightarrow (2, 4)$
 $n=4 \rightarrow 0 \Rightarrow (4, 0)$

$$\sqrt{(2-4)^2 + (4-0)^2} = \sqrt{4+16} = \sqrt{20} = 2\sqrt{5}$$



۳۵/۱۵۱



$$S = n \sqrt{12-n}$$

$$S' = \sqrt{12-n} + \frac{-n}{2\sqrt{12-n}} = \frac{2\sqrt{12-n} - n}{2\sqrt{12-n}} = 0$$

$$2\sqrt{12-n} - n = 0 \Rightarrow n = 8 \Rightarrow S = 8 \times 2 = \underline{\underline{16}}$$

$$\Rightarrow y = 2$$

$$\left. \begin{matrix} (2, 7) \\ (2, -1) \end{matrix} \right\} 2c = 8 \Rightarrow \underline{c = 4}$$

$$2b = 6 \Rightarrow b = 3$$

$$a^2 = b^2 + c^2 = 9 + 16 = 25 \Rightarrow a = 5$$

$$\text{خرج درگاه} \quad e = \frac{c}{a} = \frac{4}{5} = 0.8$$

۱۵۳
در هر صورت دقیقاً یک دایره از خارج بر می آید. آن دایره تابع هر دو کرب مجانب می‌باشد که معادله آن برابر است با خارج قسمت تقسیم صورت بر مخرج.

فاصله نقطه از خط

$$A(x_0, y_0)$$

$$ax + by + c = 0$$

$$d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

$$\frac{-\frac{x^2}{n} + \frac{n-1}{n+1}}{\frac{-n+1}{1}} \Rightarrow y = x + 1 \Rightarrow x - y + 1 = 0$$

$$\left(-3, \frac{9}{2}\right)$$

$$\Rightarrow d = \frac{\left|-3 + \frac{9}{2} + 1\right|}{\sqrt{1^2 + (-1)^2}} = \frac{\frac{1}{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2} \Rightarrow \underline{\underline{\frac{1}{\sqrt{2}}}}$$

$$dy^r - 1 \cdot y + 2x - 3 = 0$$

۱۵۴

$$\Delta(y^r - y + 1) + 2x - 3 - \Delta = 0$$

$$(y-1)^r = -\frac{r}{\Delta} (x-3)$$

$$(y-1)^r = -rp (x-h)$$

$$F = (r - \frac{1}{\Delta}, 1) = (\frac{9}{\Delta}, 1)$$

$$y=0 \Rightarrow \text{حل کلی برای } y=0 \Rightarrow x-3=0 \Rightarrow x = \frac{3}{2} \Rightarrow (\frac{3}{2}, 0)$$

$$\sqrt{(\frac{9}{\Delta} - \frac{3}{2})^2 + 1^2} = 1,28$$

۱۵۵

$$\int_{\frac{1}{r}}^r \frac{r}{x^r} dx = -r \int_{\frac{1}{r}}^r \frac{-1}{x^r} dx = \left(\frac{r}{x} \right)_{\frac{1}{r}}^r = (-1) - (-r) = r$$

$$0 \left\{ \begin{array}{c} \boxed{\begin{matrix} \circ & \circ \\ \circ & \circ \end{matrix}} \\ 2^2 \\ 1 \end{array} \right\} \left\{ \begin{array}{c} \boxed{\begin{matrix} \circ & \circ & \circ \\ \circ & \circ & \circ \\ \circ & \circ & \circ \end{matrix}} \\ 3^2 \\ 4^2 \end{array} \right\} \left\{ \begin{array}{c} \boxed{\begin{matrix} \circ & \circ & \circ & \circ \\ \circ & \circ & \circ & \circ \\ \circ & \circ & \circ & \circ \\ \circ & \circ & \circ & \circ \end{matrix}} \\ 4^2 \\ 1+3+5 \end{array} \right\} \sim$$

۱۵۳
6.3.3

$$\underline{\underline{۲۷}} \quad 9^2 + (1+2+\dots+8) = 81 + \frac{8(9)}{2} = 81 + 36 = 117$$

کزینه ۱

$$g(12) = \frac{3}{2} \rightarrow f\left(\frac{3}{2}\right) = -\frac{15}{2} \neq 12 \quad \times$$

۴۰ کزینه ۴ $\frac{152}{6.3.3}$

$$g(15) = 3 \rightarrow f(3) = 0 \neq 15 \quad \times$$

$$g(18) = \frac{9}{2} \rightarrow f\left(\frac{9}{2}\right) = \frac{36}{2} \neq 18 \quad \times$$

$$g(21) = 4 \rightarrow f(4) = 21 = 21 \quad \checkmark$$

۶۹

$$P^{-1}_{(n)} \Rightarrow x = y^2 - 2y - 3 \Rightarrow y^2 - 2y + 1 - 1 - 3 = x$$

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

$$\Rightarrow \sqrt{x+4} + 1 = \frac{n-9}{2} \Rightarrow 2\sqrt{x+4} = n-11$$

$$\Rightarrow 4(n+2) = x^2 - 22x + 121 \Rightarrow x^2 - 24x + 109 = 0$$

$$(x-21)(x-4) = 0 \Rightarrow \begin{cases} x=21 \\ x=4 \end{cases}$$

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از آنتی کمره اول ضربه می‌خورد پس عرض می‌کنیم که این خارج می‌شود

$$p = \frac{\binom{5}{2}}{\binom{11}{2}} = \frac{10}{55} = \frac{2}{11}$$

گزینه ۲

کتاب ارم

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