



[www.riazisara.ir](http://www.riazisara.ir) **سایت ویژه ریاضیات**

**درسنامه ها و جزوه های دروس ریاضیات**

**دانلود نمونه سوالات امتحانات ریاضی**

**نمونه سوالات و پاسخنامه کنکور**

**دانلود نرم افزارهای ریاضیات**

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کانال سایت ریاضی سرا در تلگرام:

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(۱۲۶)

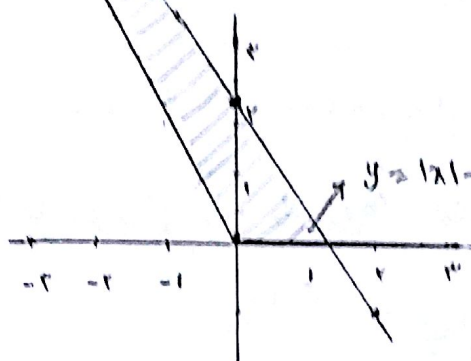
$$a_1 = 3, a_n = 2a_{n-1} - 2 \rightarrow a_n - a_v = ?$$

$$a_2 = 4, a_3 = 6, a_4 = 10, a_5 = 18, a_6 = 34, a_7 = 66, a_8 = 130$$

$$\rightarrow a_8 - a_v = 130 - 66 = 64$$

$$y = |x| - x = \begin{cases} 0 & x \geq 0 \\ -2x & x < 0 \end{cases}$$

$$y = -\frac{3}{2}x + 2 \quad \begin{matrix} x & y \\ 4 & 2 \\ 2 & -1 \end{matrix}$$



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$$y = -2x = -\frac{3}{2}x + 2 \rightarrow -\frac{1}{2}x = 2 \rightarrow x = -4 \rightarrow y = -2(-4) = 8$$

$$\rightarrow S = \frac{1}{2} \times \frac{4}{3} \times 8 = \frac{16}{3}$$

$$\log \frac{x^2 - x - 4}{x - 3} = \log 2x - 5$$

$$\begin{cases} x^2 - x - 4 > 0 \rightarrow x > 3 \text{ یا } x < -2 \\ x - 3 > 0 \rightarrow x > 3 \\ 2x - 5 > 0 \rightarrow x > 2.5 \end{cases} \rightarrow x > 3$$

$$\log \frac{(x-4)(x+2)}{(x-3)} = \log 2x - 5 \Rightarrow \log^{2x-5} \Rightarrow \log^{x+2} = \log^{2x-5}$$

$$\Rightarrow 2x - 5 = x + 2 \rightarrow x = 7 \quad \text{چون} \Rightarrow \log \sqrt[3]{x+1} = \log \sqrt[3]{8} = \log \frac{2}{3} = \frac{1}{3} - \frac{2}{3}$$

$$A + 2B = \begin{bmatrix} a-2 & 3 \\ 9 & a+2 \end{bmatrix} \Rightarrow \det(A + 2B) = 0 \Rightarrow (a-2)(a+4) - 3 \times 9 = 0$$

$$a^2 + 2a - 18 - 27 = 0 \Rightarrow a^2 + 2a - 45 = 0 \Rightarrow (a+9)(a-5) = 0 \Rightarrow \begin{cases} a = -9 \\ a = 5 \end{cases}$$

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2 + n_3 \bar{x}_3}{n_1 + n_2 + n_3} = \frac{5 \times 11.4 + 13 \times 2.5 + 5 \times 3.3}{5 + 13 + 5} = \frac{59.1}{23} = 2.57$$

(۱۲۸)

$$n = 40, x_1 + \dots + x_{40} = 240, \sum_{i=1}^{40} x_i^2 = 2190 \rightarrow cv = ?$$

(۱۲۹)

$$\Rightarrow \bar{x} = \frac{240}{40} = 6, \sigma^2 = \frac{\sum x_i^2}{n} - (\bar{x})^2 = \frac{2190}{40} - (6)^2 = 54.75 - 36 = 18.75 \rightarrow \sigma = \sqrt{18.75} \rightarrow cv = \frac{\sigma}{\bar{x}} = \frac{\sqrt{18.75}}{6}$$

$$n(S) = 34, A = \{(1,2), (2,1), (2,3), (3,2), (3,4), (4,3), (4,5), (5,4), (5,5)\}$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{10}{34} = \frac{5}{17}$$

$$x=0 \Rightarrow -2(0)+1-10-21 > 0^2+1 \rightarrow -1 > 1 \rightarrow -1 > 1$$

ناراحت  
پس گزینه های ۳، ۲، ۱ رد شدند (روش تشریحی هم دارد) ⑤ ④ ③ ② ①

$$\tan(\pi/4 + \alpha/4) = -\cot \alpha/4$$

$$\frac{\sin \alpha}{1 + \cos \alpha} = \frac{1}{2} \Rightarrow \frac{2 \sin \alpha/2 \cos \alpha/2}{2 \cos^2 \alpha/2} = \frac{\sin \alpha/2}{\cos \alpha/2} = \frac{1}{2} \rightarrow \tan \alpha/2 = 1/2$$

$$\rightarrow \cot \alpha/2 = 2$$

$$\rightarrow -\cot \alpha/4 = -2$$

$$g(x) = 2x + 1$$

$$(f \circ g)(x) = 1x^2 + 4x + 5 = (x^2 + 4x + 1) + 2x - 1 + 4$$

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

$$(f \circ g)(0) = 5, g(0) = 1 \rightarrow f(1) = \begin{cases} 4 \rightarrow \text{گزینه ۱} \\ 5 \rightarrow \text{گزینه ۲} \\ 6 \rightarrow \text{گزینه ۳} \\ 7 \rightarrow \text{گزینه ۴} \end{cases}$$

$$\lim_{x \rightarrow 2} \frac{x - \sqrt{4x-2}}{ax+b} \stackrel{H}{=} \lim_{x \rightarrow 2} \frac{1 - \frac{2}{\sqrt{4x-2}}}{a} = \frac{1 - \frac{2}{2}}{a} = \frac{1}{a} \rightarrow a = \frac{1}{2}$$

$$\lim_{x \rightarrow 2} \frac{x - \sqrt{4x-2}}{ax+b} = \frac{1}{2} \Rightarrow \frac{2a+b}{2} = \frac{1}{2} \Rightarrow 2a+b = 1 \Rightarrow b = 1-2a$$

$$\lim_{x \rightarrow 2} \frac{x - \sqrt{4x-2}}{ax+b} = \frac{1}{2} \Rightarrow \frac{2a+b}{2} = \frac{1}{2} \Rightarrow 2a+b = 1 \Rightarrow b = 1-2a$$

$$\lim_{n \rightarrow \infty} \frac{\sin^2 n - \sin n}{n^2} = \lim_{n \rightarrow \infty} \frac{2 \sin n \cos n - \sin n}{n^2} = \lim_{n \rightarrow \infty} \frac{\sin n (2 \cos n - 1)}{n^2}$$

$$= \lim_{n \rightarrow \infty} \frac{\sin n}{n} \times \lim_{n \rightarrow \infty} \frac{2 \cos n - 1}{n} = 1 \times \lim_{n \rightarrow \infty} \frac{2 \cos n - 1}{n} = \frac{2(1) - 1}{0} = \frac{1}{0}$$



(۱۳۸) گ: منظور  $f'(1)$  است:

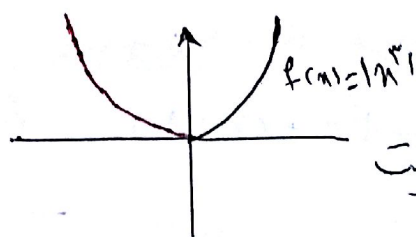
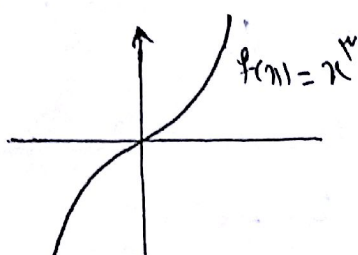
$$f'(x) = \frac{12-5}{(x+3)^2} \rightarrow f'(1) = \frac{\frac{7}{14}}{2(\frac{3}{4})} = \frac{7}{48}$$

(۱۳۹)  $P(x=3) = \frac{\binom{4}{1} \binom{5}{2}}{\binom{9}{3}} = \frac{1 \times 10}{84} = \frac{5}{42}$

$n=4$   
 $P=\frac{2}{3}$   
 $k=4, 3$

$$P(x=3) + P(x=4) = \left(\frac{4}{3}\right) \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^1 + \left(\frac{4}{3}\right) \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^0$$

$$= 4 \times \frac{8}{81} + \frac{16}{81} = \frac{48}{81} = \frac{16}{27}$$



(۱۴۱) فریب  
 یک بیت نیست پس وارد نکرست

(۱۴۲) گ

$$a, aq, aq^2, \dots, a^r, a^r q^r, a^r q^{2r}, \dots$$

$$S_1 = \frac{a}{1-q}$$

$$S_2 = \frac{a^r}{1-q^r}$$

$$S_2 = \frac{r}{3} S_1 \rightarrow \frac{a^r}{1-q^r} = \frac{r}{3} \frac{a^r}{(1-q)^r} \rightarrow r(1-q^r) = 3(1-q)^r$$

$$r - r q^r = 3 - 4q + 3q^2 \rightarrow 3q^2 - 4q + 1 = 0 \rightarrow \begin{cases} q=1 & \text{غیر قابل قبول} \\ q=\frac{1}{3} = \frac{r}{1} = 3 \checkmark \end{cases}$$

$$\cos\left(x + \frac{\pi}{4}\right) \cos\left(x - \frac{\pi}{4}\right) = \frac{1}{4} \quad \left( \cos\left(x - \frac{\pi}{4}\right) = \sin\left(x + \frac{\pi}{4}\right) \right) \quad (143)$$

$$\cos\left(x + \frac{\pi}{4}\right) \sin\left(x + \frac{\pi}{4}\right) = \frac{1}{4} \rightarrow \frac{1}{2} \sin 2\left(x + \frac{\pi}{4}\right) = \frac{1}{4}$$

$$\rightarrow \sin\left(2x + \frac{\pi}{2}\right) = \frac{1}{2} \rightarrow \cos 2x = \frac{1}{2} = \cos \frac{\pi}{3}$$

$$2x = 2k\pi \pm \frac{\pi}{3} \Rightarrow x = k\pi \pm \frac{\pi}{6}$$

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$$f'_+(x) = \frac{\cos x(1+\cos x) - (-\sin x)(\sin x)}{(1+\cos x)^2} = \frac{1+\cos x}{(1+\cos x)^2} \Rightarrow f'_+(0) = \frac{2}{4} = \frac{1}{2} \quad (144)$$

$$f'_-(x) = 2 \cos 2x \rightarrow f'_-(0) = 2(1) = 2 \rightarrow f'_-(0) - f'_+(0) = 2 - \frac{1}{2} = \frac{3}{2} = 1,5$$

$$y'_x = -\frac{f'_x}{f'_y} = -\frac{2x-2y}{-2x+2y} \Rightarrow m = y'_x = 0 \rightarrow 2x-2y = 0 \Rightarrow x=y \quad (145)$$

$$\xrightarrow{\text{جایگزینی}} 4y^2 - 8y^2 + 4y^2 + 1 = 0 \Rightarrow y^2 = 1 \rightarrow y = \pm 1 \Rightarrow x = \pm 1$$

$$f(1) = -11 \rightarrow 1+a+b = -11 \rightarrow a+b = -12 \quad (146)$$

$$f'(x) = 2x^2 + 2ax + b \rightarrow f'(1) = 4x + 2a \rightarrow f'(1) = 0 \Rightarrow 4 + 2a = 0 \Rightarrow a = -2 \rightarrow b = -9$$

$$f(x) = x^3 - 2x^2 - 9x \rightarrow f(-1) = -1 - 2 + 9 = 6$$

$$x=0 \text{ محاسبه کنیم} \Rightarrow x^2 + b = 0 \Rightarrow b = 0 \quad (147)$$

$$f(2) = 0 \rightarrow \frac{2a+2}{2} = 0 \Rightarrow 2a+2 = 0 \rightarrow a = -1 \Rightarrow f(x) = \frac{-x+2}{x^2}$$

$$f'(x) = \frac{-x^2 + 2x^2 - 2x}{x^3} = \frac{x^2 - 2x}{x^3} \Rightarrow f'(x) = 0 \Rightarrow x^2 - 2x = 0 \Rightarrow \begin{cases} x=0 \\ x=2 \end{cases}$$

$$\rightarrow f(2) = \frac{-2+2}{4} = \frac{-2}{4} = -\frac{1}{2}$$

$$O = (\alpha, \alpha) \Rightarrow (x-\alpha)^2 + (y-\alpha)^2 = r^2 \quad (148)$$

$$A(1,0) \rightarrow (1-\alpha)^2 + (0-\alpha)^2 = r^2 \Rightarrow (1-\alpha)^2 = (r-\alpha)^2$$

$$B(2,0) \rightarrow (2-\alpha)^2 + (0-\alpha)^2 = r^2 \Rightarrow (2-\alpha)^2 = (r-\alpha)^2$$

$$1 - 2\alpha + \alpha^2 = 4 - 4\alpha + \alpha^2 \Rightarrow 2\alpha = 3 \Rightarrow \alpha = \frac{3}{2} \xrightarrow{\text{جایگزینی}} (1-\frac{3}{2})^2 + (0-\frac{3}{2})^2 = r^2$$

$$r^2 = 5 \Rightarrow r = \sqrt{5}$$

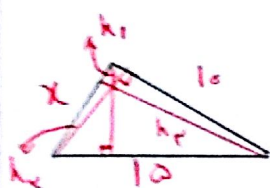
$$m = \pm \frac{b}{a} \Rightarrow \frac{b}{a} = 2 \Rightarrow b = 2a \Rightarrow e = \sqrt{1 + \frac{b^2}{a^2}} = \sqrt{1 + \frac{4a^2}{a^2}} = \sqrt{1+4} = \sqrt{5}$$

$$\int_{-1}^2 [x] |x| dx = \int_{-1}^0 + \int_0^1 + \int_1^2 = \int_{-1}^0 (-1)(-x) + \int_0^1 0(x) + \int_1^2 1(x)$$

$$= \left[ \frac{1}{2} x^2 \right]_{-1}^0 + \left[ \frac{1}{2} x^2 \right]_1^2 = \frac{1}{2} (0 - 1) + \frac{1}{2} (4 - 1) = -\frac{1}{2} + \frac{3}{2} = \frac{2}{2} = 1$$

$$\int \frac{2x^2 + 3x}{\sqrt{x}} dx = \int (2x^{\frac{3}{2}} + 3x^{\frac{1}{2}}) dx = 2 \left( \frac{2}{5} x^{\frac{5}{2}} \right) + 3 \left( \frac{2}{3} x^{\frac{3}{2}} \right)$$

$$= 2x^{\frac{5}{2}} + 2x^{\frac{3}{2}} = 2x^{\frac{1}{2}} (x^2 + 1) = 2\sqrt{x} (x^2 + 1) + C \Rightarrow f(x) = 2x + 2$$



$$h_1 + h_2 + h_3 = 10 \Rightarrow x = ?$$

$$S = \frac{1}{2} \cdot 10 \cdot h_1 = 5h_1 \rightarrow \frac{1}{2} \cdot 10 \cdot h_2 = 5h_2 \rightarrow h_2 = \frac{3}{4} h_1$$

$$S = \frac{1}{2} (10 - h_2) \cdot h_3 = 5h_3$$

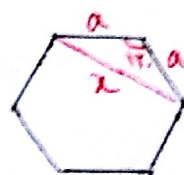
$$\Rightarrow S = \frac{1}{2} x h_3 = 5h_3 \Rightarrow x(h_1 + h_2 + h_3) = 10h_1 \rightarrow x(h_1 + \frac{3}{4} h_1) = 10h_1$$

$$x \left( \frac{7}{4} \right) = 10 \Rightarrow x = 4$$

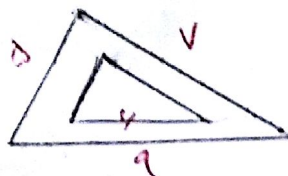
$$S = \frac{3\sqrt{3}}{4} a^2 \Rightarrow 4\sqrt{3} = \frac{3\sqrt{3}}{4} a^2 \Rightarrow a^2 = 4 \Rightarrow a = \sqrt{4}$$

$$\text{میزان زاویه مرکزی} = \frac{(n-2) \times 180}{n} = \frac{2 \times 180}{4} = 90^\circ$$

$$x^2 = a^2 + a^2 - 2aa \cos 120^\circ = 4 + 4 - 2(4) \left( -\frac{1}{2} \right) = 12 \Rightarrow x = \sqrt{12} = 2\sqrt{3}$$





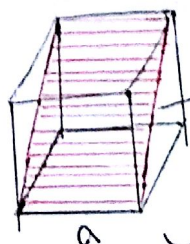


$$\frac{S_2}{S_1} = \frac{S - S_1}{S_1} = \frac{S}{S_1} - 1 = k^2 - 1 = \left(\frac{h}{q}\right)^2 - 1$$

$$k = \frac{h}{q} = \frac{9}{4} = \frac{3}{2}$$

$$= \frac{9}{4} - 1 = \frac{5}{4} = 1.25$$

(۱۵۴)



صفحه مربع = صفحه مستطیل

$$S = a \cdot \sqrt{2} \cdot a = \sqrt{2} a^2 = 9\sqrt{2} - a^2 = 9 \rightarrow a = 3$$

$$a \cdot \sqrt{3} = 3\sqrt{3}$$

(۱۵۵)

موفق و سرفراز باشید

مهدی بیرانوند

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