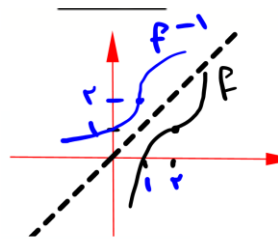


۱- الف) درست



(ب)

$$1-x=0 \rightarrow x=1$$

$$D=? \quad 1-x>0 \rightarrow x<1 \rightarrow \lim_{x \rightarrow 1^-} \frac{[x]}{\sqrt{1-x}} = \frac{\text{مطلق}}{0^+} = 0$$

۲- الف) $-\infty$

$$\lim_{x \rightarrow \pi} \frac{x-4}{1+\cos \pi} = \frac{\pi-4}{1+(-1)^+} = \frac{\pi-4}{0^+} = -\infty$$

(ب) ۹-

$$y+1=2(x-4) \xrightarrow{x=0} y+1=-8 \rightarrow y=-9$$

(ج) $1-\sqrt{2}$

$$y = \frac{1}{2} \left(\frac{1 - \cos 2\pi x}{2} \right) - \sqrt{2} \quad y = -\frac{5}{2} \cos 2\pi x + \frac{5}{2} - \sqrt{2}$$

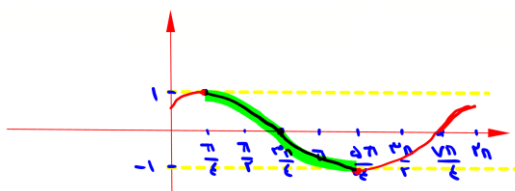
$$\min = -|a| + c = -\frac{5}{2} + \frac{5}{2} - \sqrt{2} = -\sqrt{2} \quad T = \frac{2\pi}{|b|} = \frac{2\pi}{2\pi} = 1$$

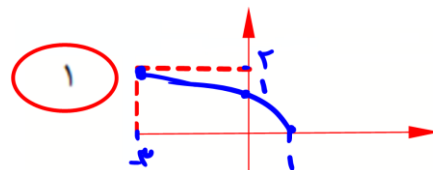
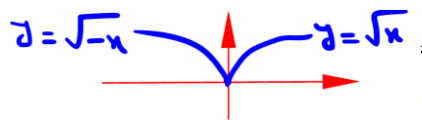
(ت) ۴

$$y' = 3x^2 + 2mx - 1 \Rightarrow y'' = 6x + 2m \Rightarrow f''(-1) = 0 \Rightarrow -6 + 2m = 0 \Rightarrow m = 3$$

$$f(-1) = -1 + 3 + 1 + 1 = 4$$

۳- الف





$$D_f = [-3, 1] \quad (1 - \text{طول}) \times (-2) \quad D_g = [0, 1]$$

$$R_f = [0, 2] \quad (2 \times \text{عرض}) + 1 \quad R_g = [-3, 1]$$

$$\underbrace{f(-2x+4) \geq f(4x+10)}_{\text{تغییر جهت داریم}} \quad \text{و} \quad \underbrace{f(x) = -x^2 - 5}_{\text{نزولی است}}$$

$$-2x + 4 \leq 4x + 10$$

$$6x \geq -6 \Rightarrow x \geq -1$$

-۶

$$q(-2) = -1 + 2 + 3 = -3$$

$$p(-2) = -3 \Rightarrow -1 - 2(a - 1) + 3 = -3 \Rightarrow -1 - 2a + 1 = -6 \Rightarrow -2a = 1 \Rightarrow a = -\frac{1}{2}$$

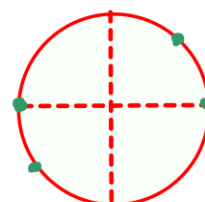
-۷

$$T = \frac{\frac{2\pi}{1}}{\left|\frac{m\pi}{1}\right|} = \frac{2\pi}{|m\pi|} = 1 \Rightarrow |m| = \frac{1}{2} \Rightarrow m = \pm \frac{1}{2} \xrightarrow{m>0} m = \frac{1}{2}$$

$$f(x) = \frac{1}{2} \sin \alpha - 2 \Rightarrow \max = |a| + c \Rightarrow \max = \frac{1}{2} - 2 = -\frac{3}{2}$$

-۸

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



$$\begin{cases} 2x + \frac{\pi}{4} = 2k\pi + \frac{\pi}{4} \Rightarrow 2x = 2k\pi \Rightarrow x = k\pi \\ 2x + \frac{\pi}{4} = 2k\pi + \pi - \frac{\pi}{4} \Rightarrow 2x = 2k\pi + \frac{\pi}{2} \Rightarrow x = k\pi + \frac{\pi}{4} \end{cases}$$

$$\mathbb{C} \cdot \mathcal{P} = \left\{ 0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}, 2\pi \right\}$$

۹- الف)

$$۱) \frac{-2a}{\cdot} = +\infty$$

$$۲) \frac{-2a}{\cdot+} = -\infty$$

ب)



۱۰-

$$\text{الف}) = \lim_{x \rightarrow \cdot+} \left(\frac{1}{x} + \frac{\sin^2 x}{x^2} \right) = +\infty + \lim_{x \rightarrow \cdot+} \frac{\sin x}{x} \times \frac{\sin x}{x} = +\infty + 1 = +\infty$$

$$\text{ب}) = \lim_{x \rightarrow -\infty} \frac{2x^2 + x^2}{x^2} = 2$$

۱۱-

$$m_d = \frac{\Delta y}{\Delta x} = -\frac{4}{2} = -2$$

$$\frac{-f'(2)}{3} = \frac{2}{3}$$

۱۲-

$$f(\cdot) = \cdot$$

$$f'_-(\cdot) = \lim_{x \rightarrow \cdot^-} \frac{f(x) - f(\cdot)}{x - \cdot} = \lim_{x \rightarrow \cdot^-} \frac{[x](x - 2)}{x} = \lim_{x \rightarrow \cdot^-} \frac{-x + 2}{x} = \frac{2}{\cdot^-} = -\infty \quad x \text{ وجود ندارد}$$

مشتق در $\cdot$

$$f'_+(\cdot) = \lim_{x \rightarrow \cdot^+} \frac{f(x) - f(\cdot)}{x - \cdot} = \lim_{x \rightarrow \cdot^+} \frac{[x](x - 2)}{x} = \cdot$$

-۱۳

$$\text{الف) } f'(x) = \frac{2 \cos \frac{x}{2} (x^2 + \sqrt{x}) - 4 \left(2x + \frac{1}{2\sqrt{x}} \right) \sin \frac{x}{2}}{(x^2 + \sqrt{x})^2}$$

$$\text{ب) } f'(x) = 4(\delta x^2 + 7x -)^2(1\delta x^2 + 7) + 18 \tan^2 2x (1 + \tan^2 2x)$$

-۱۴

$$y' = -\frac{1}{x^2} f' \left(\frac{1}{x} \right) \xrightarrow{x=\frac{1}{6}} y' = -16 \times 6 = -96$$

$$f'(x) = \sqrt{x} + x$$

$$f' \left(\frac{1}{x} \right) = f'(4) = 2 + 4 = 6 \quad x = \frac{1}{4}$$

-۱۵

$$f(6) = \frac{72}{6} = 12 \quad f(4) = \frac{36 + 16}{4} = \frac{52}{4} = 13$$

$$\text{آهنگ متوسط} = \frac{f(6) - f(4)}{6 - 4} = \frac{12 - 13}{2} = \frac{-1}{2}$$

$$f'(t) = \frac{2t^2 - 36 - t^2}{t^2} = \frac{t^2 - 36}{t^2}$$

$$\frac{t^2 - 36}{t^2} = -\frac{1}{2} \Rightarrow 2t^2 - 72 = -t^2 \Rightarrow 3t^2 = 72 \quad t^2 = 24 \Rightarrow t = 2\sqrt{6}$$

-۱۶

$$f'(1) = \cdot \quad (1, 2) \in f$$

$$f'(x) = 3x^2 + a \quad f'(1) = \cdot \Rightarrow 3 + a = \cdot \Rightarrow a = -3$$

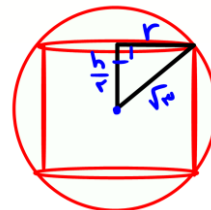
$$f(1) = 2 \Rightarrow 1 + a + b = 2 \Rightarrow 1 - 3 + b = 2 \Rightarrow b = 4$$

-۱۷

$$r^2 = \frac{h^2}{4} = 3 \Rightarrow r^2 = 3 - \frac{h^2}{4}$$

$$V = \pi r^2 h = \pi \left(3 - \frac{h^2}{4} \right) h = 3\pi h - \frac{\pi h^3}{4}$$

$$V' = 3\pi - \frac{3\pi}{4} h^2 = 0 \Rightarrow \frac{3\pi}{4} h^2 = 3\pi \Rightarrow h^2 = 4 \Rightarrow h = 2$$



-۱۸

$$f''(2) = 0$$

$$f''(0) = -2$$

$$f'(x) = 3ax^2 + 2bx + 11$$

$$f''(x) = 6ax + 2b \Rightarrow f''(0) = -2 \Rightarrow 2b = -2 \Rightarrow b = -1$$

$$f''(2) = 0 \Rightarrow 12a - 2 = 0 \Rightarrow 12a = 2 \Rightarrow a = \frac{1}{6}$$

-۱۹

$$f'(x) = \frac{-4}{(3x+4)^2} < 0$$

$$\text{مجانِب افقی } x = -\frac{4}{3} \quad y = -\frac{1}{3}$$

$$x = 0 \Rightarrow y = 0 \quad (0,0) \in f$$

$$y' = -4(3x+4)^{-2} \Rightarrow y'' = 3 \times 8(3x+4)^{-3} = \frac{24}{(3x+4)^3}$$

