

$$g'(x) = (2 + g(x)(1 + g^2(x)) - \sqrt{x} \sin x) f'(x + g^2(x) + \sqrt{x} \cos x)$$

$$\xrightarrow{x = \frac{\pi}{4}} (2 \times 2 - 1) f'(2) = \sqrt{\pi} \rightarrow 3 f'(2) = \sqrt{\pi} \rightarrow f'(2) = \frac{\sqrt{\pi}}{3}$$

← جواب

$$(f(x) - 2g(x))' \rightarrow f(x) = \frac{(2 + \cos x)(2 + \sin^2 x - 2 \cos x)}{(2 + \cos x)(2 - \cos x)}$$

$$\rightarrow \frac{2 + \sin^2 x - 2 \cos x - 2}{2 - \cos x} = \frac{\sin^2 x - 2 \cos x}{2 - \cos x} = -\cos x \xrightarrow{y} \sin x$$

$$\rightarrow \sin \frac{\sqrt{5}}{4} = -\frac{1}{2}$$

$$x \geq \frac{\pi}{4} \Rightarrow (x-3)\sqrt{9x} \xrightarrow{\text{مشتق بگیر}} 4\sqrt{9x} \rightarrow \varepsilon \cdot \frac{\sqrt{9x}}{4} = 2\sqrt{9x}$$

$$x < \frac{\pi}{4} \rightarrow (3-\varepsilon x)\sqrt{9x} \xrightarrow{\text{مشتق بگیر}} (-\varepsilon)\sqrt{9x} \rightarrow -\varepsilon \sqrt{9x} = -2\sqrt{9x}$$

$$2\sqrt{9x} - (-2\sqrt{9x}) = 4\sqrt{9x} = 2\sqrt{4} \rightarrow \sqrt{9x} = \frac{\sqrt{4}}{2} = 2 \Rightarrow 3x = \frac{4}{9} \rightarrow x = \frac{4}{27}$$

$$f(\varepsilon) + f'(x) = -1 \rightarrow 2 - 4a - a = -1 \rightarrow 5a = 3$$

$$a = \frac{3}{5} \rightarrow f'(x) = -0.4$$

$y = 2 - 9x$
 $f'(x) = -9$

$$\frac{ax-1}{3x+1} = \frac{a}{3} + \frac{b}{3x+1} \Rightarrow \frac{3ax-1}{3x+1} = a + \frac{b}{3x+1}$$

④ با هر عددی $f(x) = g(x)$
در صاف باشد با $\frac{1}{x}$
 $y = \frac{a}{x} + \frac{b}{x}$

$$3ax - 1 = 3x + 14x + b$$

$$3x + (14 - 3a)x + 1 = 0 \rightarrow x + \frac{(14 - 3a)}{2}x + \frac{1}{2} = 0$$

$$\rightarrow \frac{14 - 3a}{2} = -1 \rightarrow a = 5 \rightarrow \text{جواب}$$

$$f'(x) = 3x^2 + a \xrightarrow{12+a=0} a = -12$$

④ هم مشتق، هم مقدار
با هم منهای

$$f(x) = x^3 - 12x - b \rightarrow 1 - 12 - b = 0 \rightarrow b = -11$$

$$-11 + 12 = 1 \rightarrow \text{جواب}$$

6

$$\lim_{n \rightarrow \infty} \frac{\sin^n(n) \wedge \sin^{n-1}(n^2) \cos(n^2) 2n \sin \alpha}{(1 - \ln n)^m} \xrightarrow{1 - \ln n \sim \frac{1}{n}} \frac{2n \cdot n^{n-2} \times 1 \times 2n}{\frac{2n^m}{n^m}}$$

$$\rightarrow \frac{2 \cdot n \cdot 2 \times (x^{n-1})}{x^{2m}} = 2 \xrightarrow{\frac{1}{x}} \begin{cases} \varepsilon n - 1 = 2m \\ 2 \cdot n = 2 \end{cases} \left\{ \begin{array}{l} n = 2 \\ m = 1/2 \end{array} \right\} \text{ و } \begin{array}{l} \text{برای } n=2 \\ \text{دارای } \varepsilon=1/2 \end{array}$$

$$2m + n = 7 + 2 = 9 \rightarrow \text{جواب}$$

7

$$f(x) = \frac{\sqrt{x+1}}{\sqrt{x-1}} \rightarrow f(x) = h(l(x)) \rightarrow l'(x) h'(l(x)) \quad h(x) = \frac{x+1}{x-1}$$

$$\rightarrow \frac{1}{2\sqrt{x}} \times \frac{-1}{(\sqrt{x-1})^2} \xrightarrow{x=4} \frac{1}{4} \times \frac{-1}{\varepsilon} = -\frac{1}{12}$$

$$f'(x) = -\frac{1}{12} \rightarrow f'(x) = -12 \leftarrow \text{مشتق } f \text{ ملکی} \leftarrow \text{مشتق } f \text{ اس} \leftarrow \text{مشتق } f \text{ اس}$$

$$\begin{aligned} h(x) &= \frac{x+1}{x-1} \\ l(x) &= \sqrt{x} \\ f(2) &= 3 \\ f(4) &= 2 \\ 3 &= 4 \end{aligned}$$

8

$$f(1) = 1 \quad \Delta = \frac{y_B - y_A}{x_B - x_A} = \frac{y_B - 1}{-1 - 0} = -11 \rightarrow y_B = 12$$

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

$$f(x) = (x^2+1)^2 (1 - \frac{x}{2}) \rightarrow f'(x) = 2(x^2+1)(-x/2+1) - 1/2(x^2+1)^2$$

$$f'(1) = 2 \times 2 \times \varepsilon \times \frac{1}{2} - \varepsilon = 12 - \varepsilon = 11 \rightarrow \text{جواب}$$

9

$$y = \sin \alpha \cos \alpha \left[\frac{\pi}{2}, \frac{\pi}{4} \right] \xrightarrow{\frac{\pi}{4} \rightarrow 0, \frac{\pi}{2} \rightarrow 0} \frac{-1-0}{\frac{\pi}{2}} = -\frac{1}{\frac{\pi}{2}}$$

$$y = \sin^2 \alpha - \cos^2 \alpha = -\cos 2\alpha \rightarrow \frac{\pi}{4} \rightarrow 1, \frac{\pi}{2} \rightarrow 0 \rightarrow \frac{1-0}{\frac{\pi}{2}} = \frac{1}{\frac{\pi}{2}}$$

$$\Rightarrow \frac{-\frac{1}{\frac{\pi}{2}}}{\frac{1}{\frac{\pi}{2}}} = -1 \leftarrow \text{جواب}$$

10

انتهای