

11.5

کتاب (مسابقات) / دوازدهم دختره

بنا

تاریخ 19

$$\lim_{x \rightarrow 2} x \left[\frac{x-2}{x} \right] + a \left[\frac{x+2}{x} \right]$$

(2)

(1)

$$\rightarrow x^+ \rightarrow x \left[\frac{x-(-2^+)}{x} \right] + a \left[\frac{-2^++x}{x} \right] = x \left[\frac{x}{x} \right] + a \left[\frac{0}{x} \right] = 2$$

$$\rightarrow x^- \rightarrow x \left[\frac{x-(2^-)}{x} \right] + a \left[\frac{-2^-+x}{x} \right] = x \left[\frac{x}{x} \right] + a \left[\frac{0}{x} \right] = 2 - a$$

$$2 - a = 2 \rightarrow a = 0 \rightarrow \left[\frac{0}{x} \right] = \left[\frac{x}{x} \right] = 1 \rightarrow 2$$

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

(2)

$$\left[x \times \left(\frac{1}{x} \right)^- - 1 \right] = \left[1^- - 1 \right] = \left[0^- \right] = -1 \xrightarrow{\lim} (-1) \rightarrow 2$$

$$\lim_{x \rightarrow -\frac{1}{\sqrt{2}}} [1/x^2 - x] \rightarrow y = 1/x^2 - x \quad \text{مشتق} \quad y' = 2/x^3 - 1$$

(3)

x	$-\frac{1}{\sqrt{2}}$	$+\frac{1}{\sqrt{2}}$
y'	+	-
y	↗	↘

$\rightarrow x = \frac{1}{\sqrt{2}} \rightarrow \left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right)$

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

(2)

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SUBJECT

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$$1. \lim_{x \rightarrow \left(\frac{1}{2}\right)^-} \frac{\log x - 0 + \left[\frac{x}{2x^2}\right]}{17x - \left[-\frac{x}{2x^2}\right]}$$

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

$$\textcircled{II} = -a \rightarrow x = -\frac{1}{2}^- \rightarrow \left[\frac{x}{2x^2}\right] = \left[-1^+\right] = -1$$

$$\Rightarrow \frac{\log x - 0 + 1}{17x - (-1)} = \frac{\log x + 1}{17x + 1} \quad x = -\frac{1}{2}^- \rightarrow \frac{-\infty + 1}{-\infty + 1} = -\infty \rightarrow 2.$$

لم نأخذ في الحسبان أن $x = -\frac{1}{2}^-$ فيكون $\frac{x}{2x^2} = -1^+$

$$7. \lim_{x \rightarrow 1^+} \frac{\sin^2 x}{[x] + \cos x} \Rightarrow \frac{\sin^2 x}{[1^+] + \cos x} = \frac{\sin^2 x}{1 + \cos x}$$

$$9. x = 0 \rightarrow \frac{0}{1-1} = \frac{0}{0} \rightarrow$$

$$10. \sin^2 x = 1 - \cos^2 x \rightarrow \frac{1 - \cos^2 x}{1 + \cos x} = \frac{(1 - \cos x)(1 + \cos x)}{1 + \cos x}$$

$$11. 1 - \cos x \rightarrow x = 1 \rightarrow 1 - (-1) = 2$$

$$12. \lim_{x \rightarrow -1} \frac{\sqrt{2x-5} - \sqrt{4x+3}}{1 + \sqrt{x}} = \frac{0}{0} \rightarrow$$

$$14. \frac{\sqrt{2x-5} - \sqrt{4x+3}}{1 + \sqrt{x}} \times \frac{\sqrt{2x-5} + \sqrt{4x+3}}{\sqrt{2x-5} + \sqrt{4x+3}} \rightarrow \frac{(2x-5) - (4x+3)}{(1 + \sqrt{x})(\sqrt{2x-5} + \sqrt{4x+3})}$$

$$16. \frac{1+1+1}{1+1} = \frac{3}{2} \Rightarrow \frac{(-x-1)}{1+x} \times \frac{x}{x} = -1 \times \frac{x}{x} = -1$$

$$17. \lim_{x \rightarrow 1} \frac{x - \sqrt{x+1}}{x - \sqrt{4x+1}} = \frac{0}{0} \rightarrow$$

$$19. \text{h.o.p} \rightarrow x - \left(\frac{x}{x} \times \frac{1}{\sqrt{x}}\right) \quad x=1 \rightarrow x - \left(\frac{x}{x} \times 1\right) = -\frac{x}{x} = -1$$

$$21. = \frac{-\frac{x}{x}}{\frac{0}{x}} = \frac{-1}{0} = -\infty$$



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$$\lim_{x \rightarrow 0} \frac{a + \sqrt{bx+c}}{x} = \frac{1}{2} \rightarrow \frac{a + \sqrt{c}}{0} = \frac{1}{2} \rightarrow \text{برای جواب این بار صورت و مخرج هم میزنیم} \quad (1)$$

$$\frac{a + \sqrt{c}}{0} = \frac{0}{0} \rightarrow a = -\sqrt{c} \rightarrow \text{حالا چون صورت و مخرج داریم با هم میزنیم:}$$

$$\frac{a + \sqrt{bx+c}}{x} \times \frac{a - \sqrt{bx+c}}{a - \sqrt{bx+c}} = \frac{a^2 - bx - c}{x(a - \sqrt{bx+c})} \quad \frac{a - \sqrt{c}}{a - \sqrt{c}} \rightarrow \frac{a^2 - c}{a - \sqrt{bx+c}}$$

$$\frac{-bx}{x(a - \sqrt{bx+c})} = \frac{-b}{a - \sqrt{bx+c}} \quad x=0, \quad \frac{-b}{a - \sqrt{c}} = \frac{-b}{2a} = \frac{1}{2}$$

$$\rightarrow -\varepsilon b = 2a \rightarrow a = -\frac{1}{2}b \rightarrow b = -\frac{1}{2}a, \quad c = a^2$$

$$\rightarrow \frac{a \times b}{c} = \frac{a \times -\frac{1}{2}a}{a^2} = \frac{-\frac{1}{2}a^2}{a^2} \rightarrow \frac{-1}{2} \rightarrow 2$$

$$\lim_{x \rightarrow \infty} \frac{\varepsilon + K \left[\frac{x}{x} \right]}{\sin x} = +\infty$$

$$\begin{aligned} &\rightarrow x \rightarrow \infty^+ \rightarrow \frac{\varepsilon + K}{0^+} = +\infty \\ &\rightarrow x \rightarrow \infty^- \rightarrow \frac{\varepsilon - K}{0^-} = +\infty \end{aligned}$$

$$\textcircled{I} \quad \varepsilon - K > 0 \rightarrow \varepsilon > K \rightarrow K < \varepsilon \rightarrow K \in \left(\frac{\varepsilon}{2}, \varepsilon \right)$$

$$\textcircled{II} \quad \varepsilon - K < 0 \rightarrow \varepsilon < K \rightarrow \frac{\varepsilon}{2} < K$$

$$\rightarrow [K] \xrightarrow{\text{مقدار}} \left[-\frac{\varepsilon}{2} \right] = \frac{-\varepsilon}{2} \rightarrow 2$$

$$\lim_{x \rightarrow 1} \frac{b\sqrt{x+1} - 2b}{2x - b} = \frac{0}{0} \rightarrow \text{چون صورت و مخرج هم میزنیم، باید جواب میزنیم} \quad (1)$$

$$1a - b = 0 \rightarrow b = 1a \rightarrow \text{حالا چون جواب است با هم میزنیم:}$$

$$\rightarrow \frac{b(\sqrt{x+1} - 2)}{b(\frac{1}{2}x - 1)} = \frac{\sqrt{x+1} - 2}{\frac{1}{2}x - 1} \times \frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2} = \frac{x\sqrt{x+1} - 4}{(\frac{1}{2}x - 1)(\sqrt{x+1} + 2)}$$

$$\rightarrow \frac{2(\sqrt{x} - 2)}{(\frac{1}{2}x - 1) \times \text{مخرج}} = \frac{2(x - 4)}{(\frac{1}{2}x - 1) \times \text{مخرج} \times 2} = \frac{2(x - 4)}{1(x - 4) \times \text{مخرج} \times 2}$$

$$\rightarrow \text{مخرج} \rightarrow (x=1) \rightarrow \varepsilon \times (\varepsilon)^n \Rightarrow \frac{x}{\varepsilon} \times \frac{1}{\varepsilon \times \varepsilon^n} = \frac{1}{\varepsilon^{n+1}} \rightarrow 2$$

سوال ۱۰

$$1a - b = 0 \rightarrow b = 1a$$

$$\lim_{x \rightarrow 1} \frac{1a(\sqrt{x+\sqrt{x}} - 1)}{ax - 1a} = \frac{1a(\sqrt{x+\sqrt{x}} - 1)}{ax - 1a} \times \frac{\sqrt{x+\sqrt{x}} + 1}{\sqrt{x+\sqrt{x}} + 1} =$$

$$\lim_{x \rightarrow 1} \frac{1a(\sqrt{x} - 1)}{a(x-1) \times 1} \rightarrow \lim_{x \rightarrow 1} \frac{1(\sqrt{x} - 1)}{(\sqrt{x} - 1)(\sqrt{x} + 1 + 1\sqrt{x})} = \frac{1}{1+1} = \frac{1}{2}$$