

سوال ۱

$$\lim_{x \rightarrow 1} \frac{f(x)^2 - \sqrt{x} + 3}{\Delta x^2 - \lambda x + 3} \rightarrow \frac{f(1)^2 - \sqrt{1} + 3}{\Delta(1)^2 - \lambda(1) + 3} = \frac{f - \sqrt{1} + 3}{\Delta - \lambda + 3} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{(f(x)-3)(x-1)}{(\Delta x - 3)(x-1)} = \frac{f(x)-3}{\Delta x - 3}$$

$$= \frac{f(1)-3}{\Delta(1)-3} = \frac{1}{2}$$

سوال ۲

$$\lim_{x \rightarrow 0} \frac{|3x-1| - |3x+1|}{x} \rightarrow \frac{|3(0)-1| - |3(0)+1|}{0} = \frac{1-1}{0} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} x \rightarrow 0 \Rightarrow -\frac{1}{3} < x < \frac{1}{3} \Rightarrow$$

$$F(x) = \frac{9x}{x} = 9$$

$$\frac{-3x+1 - 3x-1}{x} = -4$$

سوال ۳

$$\lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x}-2} \rightarrow \frac{2-2}{\sqrt{2}-2} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{(\sqrt{x}-2)(\sqrt{x}+2)}{(\sqrt{x}-2)} = \sqrt{x} + 2 \xrightarrow{x \rightarrow 2} \sqrt{2} + 2 = 2+2 = 4$$

سوال ۴

$$\lim_{x \rightarrow 2} \frac{x - \sqrt{2x}}{2x^2 - x - 4} \rightarrow \frac{2 - \sqrt{2(2)}}{2(2)^2 - 2 - 4} = \frac{2-2}{8-2-4} = \frac{0}{2} = 0 \xrightarrow{\text{رفع ابهام}} \frac{\sqrt{x}(\sqrt{x}-\sqrt{2})}{(2x+3)(x-2)} = \frac{\sqrt{x}}{(2x+3)(\sqrt{x}+\sqrt{2})}$$

$$\xrightarrow{x \rightarrow 2} \frac{\sqrt{2}}{(2(2)+3)(\sqrt{2}+\sqrt{2})} = \frac{\sqrt{2}}{14\sqrt{2}} = \frac{1}{14}$$

سوال ۵

$$\lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{2 - \sqrt{2-x}} \rightarrow \frac{1 - \sqrt{1}}{2 - \sqrt{2-1}} = \frac{0}{1} = 0 \xrightarrow{\text{رفع ابهام}} \frac{1-x}{1-x} \times \frac{1}{2} = \frac{1-x}{2} \times \frac{1}{2} = \frac{1-x}{4} \xrightarrow{x \rightarrow 1} \frac{1-1}{4} = 0$$

سوال ۶

$$\lim_{x \rightarrow 2} \frac{\sqrt[3]{3x+2} - 2}{\sqrt[3]{\Delta x + 2} - 2} \rightarrow \frac{\sqrt[3]{3(2)+2} - 2}{\sqrt[3]{\Delta(2)+2} - 2} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{3}{3} \times \frac{3}{3} = \frac{3(3x+2-8)}{\Delta} \times \frac{2V}{(\omega^2 + \omega + 1)(\omega - 2)}$$

$$= \frac{3 \times 2V}{\Delta \times \omega} = \frac{11}{5}$$

سوال ۷

$$\lim_{x \rightarrow 1} \frac{\sqrt[3]{3x+\sqrt{x}} - 2}{\sqrt[3]{x} - 1} \rightarrow \frac{\sqrt[3]{3(1)+\sqrt{1}} - 2}{\sqrt[3]{1} - 1} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{3(3x+\sqrt{x}-2)}{(x-1)^2} = \frac{3(3\sqrt{x}+2)(\sqrt{x}-1)}{(x-1)^2}$$

$$= \frac{3(3\sqrt{x}+2)(\sqrt{x}-1)}{(\sqrt{x}-1)(\sqrt{x}+1) \times 2} = \frac{3(3\sqrt{x}+2)}{2(\sqrt{x}+1)} \xrightarrow{x \rightarrow 1} \frac{3(3\sqrt{1}+2)}{2(\sqrt{1}+1)} = \frac{21}{4}$$

سوال ۸

$$\lim_{x \rightarrow \pi} \frac{1 + \cos^2 x}{\sin^2 x} \rightarrow \frac{1 + \cos^2 \pi}{\sin^2 \pi} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{(1 + \cos^2 x)(\cos^2 x - \cos x + 1)}{(1 - \cos x)(1 + \cos x)} =$$

$$\frac{\cos^2 x - \cos x + 1}{1 - \cos x} \xrightarrow{x \rightarrow \pi} \frac{\cos^2 \pi - \cos \pi + 1}{1 - \cos \pi} = \frac{1+1+1}{1-(-1)} = \frac{3}{2}$$

سوال ۹

$$\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan x}{\sin x - \cos x} \rightarrow \frac{1 - \tan \frac{\pi}{4}}{\sin \frac{\pi}{4} - \cos \frac{\pi}{4}} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{\cos x - \sin x}{\sin x - \cos x} = \frac{\cos x - \sin x}{\cos x (\sin x - \cos x)} = \frac{-1}{\cos x}$$

$$\xrightarrow{x \rightarrow \frac{\pi}{4}} \frac{-1}{\cos \frac{\pi}{4}} = -\sqrt{2}$$

سوال ۱۰

$$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\tan^2 x - 1}{\cos^2 x} \rightarrow \frac{\tan^2 \frac{\pi}{4} - 1}{\cos^2 \frac{\pi}{4}} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{\sin^2 x - \cos^2 x}{\cos^2 x} = \frac{\sin^2 x - \cos^2 x}{\cos^2 x (\cos^2 x - \sin^2 x)} = \frac{-1}{\cos^2 x}$$

$$\xrightarrow{x \rightarrow \frac{\pi}{4}} \frac{-1}{\cos^2 \frac{\pi}{4}} = -2$$