نام و نام خانوادگی : آیلین عظیمی   تکلیف : ۲۰   کلاس : یکشنبه یازدهم دفتر

۱

$$\lim_{x\to 1} \frac{4x^2-7x+3}{5x^2-8x+3} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \lim_{x\to 1} \frac{4\cancel{(x-1)}(x-\frac{3}{4})}{5\cancel{(x-1)}(x-\frac{3}{5})} = \frac{4(1-\frac{3}{4})}{5(1-\frac{3}{5})} = \frac{1}{2}$$

۲

$$\lim_{x\to 0} \frac{|3x-1|-|3x+1|}{x} = \frac{0}{0}$$

$$0^+ : \frac{\underbrace{|3x-1|}_{\ominus}-\underbrace{|3x+1|}_{\oplus}}{x} = \frac{-3x\cancel{+1}-3x\cancel{-1}}{x} = \frac{-6x}{x} = -6$$

$$0^- : \frac{\underbrace{|3x-1|}_{\ominus}-\underbrace{|3x+1|}_{\oplus}}{x} = \frac{-3x+1-3x-1}{x} = -6$$

$$= -6$$

۳

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

۴

$$\lim_{x\to 2} \frac{x-\sqrt{2x}}{2x^2-x-6} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \lim \frac{x-\sqrt{2x}}{2x^2-x-6} \times \frac{x+\sqrt{2x}}{x+\sqrt{2x}} = \frac{x^2-2x}{(2x^2-x-6)(x+\sqrt{2x})} = \frac{x\cancel{(x-2)}}{\cancel{(x-2)}(2x+3)(x+\sqrt{2x})}$$

$$= \lim_{x\to 2} \frac{x}{(2x+3)(x+\sqrt{2x})} = \frac{2}{7(4)} = \frac{1}{14}$$

۵

$$\lim_{x\to 1} \frac{1-\sqrt{x}}{2-\sqrt{5-x}} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \lim_{x\to 1} \frac{1-\sqrt{x}}{2-\sqrt{5-x}} \times \frac{2+\sqrt{5-x}}{2+\sqrt{5-x}} = \frac{(1-\sqrt{x})\overbrace{(2+\sqrt{5-x})}^{2+\sqrt{4}=4}}{4-5+x} = \frac{(1-\sqrt{x})\times 4}{x-1}$$

$$= \frac{4\overset{-1}{\cancel{(1-\sqrt{x})}}}{(\sqrt{x}+1)\cancel{(\sqrt{x}-1)}} = \lim_{x\to 1} \frac{-4}{\sqrt{x}+1} = \frac{-4}{2} = -2$$

$$\lim_{x\to 4}\frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to 4}\frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3}\times\frac{1}{1}\times\frac{ق}{ق}=\frac{3x+4-16}{\underbrace{\sqrt{3x+4}+4}_{8}}\times\frac{\overbrace{\sqrt[3]{(5x+7)^2}+3\sqrt[3]{5x+7}+9}^{27}}{5x+7-27}$$ ۶

$$=\frac{27}{8}\times\frac{\overset{3(x-4)}{3x-12}}{\underset{5(x-4)}{5x-20}}=\lim\frac{27}{8}\times\frac{3}{5}=\frac{81}{40}$$

$$\lim_{x\to 1}\frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to 1}\frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}\times\frac{1}{1}\times\frac{ق}{ق}=\frac{3x+\sqrt{x}-4}{\underbrace{\sqrt{3x+\sqrt{x}}+2}_{4}}\times\frac{\overbrace{\sqrt[3]{x^2}+\sqrt[3]{x}+1}^{3}}{x-1}$$ ۷

$$=\frac{3}{4}\times\frac{3x+\sqrt{x}-4}{x-1}=\frac{3}{4}\times\frac{3(\sqrt{x}-1)(\sqrt{x}+\frac{4}{3})}{(\sqrt{x}+1)(\sqrt{x}-1)}=\lim_{x\to 1}\frac{\frac{9}{4}(\sqrt{x}+\frac{4}{3})}{\sqrt{x}+1}=\frac{\frac{9}{4}\times\frac{7}{3}}{2}=\frac{21}{8}$$

$$\lim_{x\to \pi}\frac{1+\cos^3 x}{\sin^2 x}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to \pi}\frac{1+\cos^3 x}{\sin^2 x}=\frac{\cancel{(1+\cos x)}(1-\cos x+\cos^2 x)}{\underset{\cancel{(1+\cos x)}(1-\cos x)}{(1-\cos^2 x)}}$$ ۸

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

$$\lim_{x\to \frac{\pi}{4}}\frac{1-\tan x}{\sin x-\cos x}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to \frac{\pi}{4}}\frac{1-\tan x}{\sin x-\cos x}=\frac{1-\frac{\sin x}{\cos x}}{\sin x-\cos x}=\frac{\overset{-1}{\cancel{\cos x-\sin x}}}{\cos x(\cancel{\sin x-\cos x})}$$ ۹

$$=\lim_{x\to \frac{\pi}{4}}\frac{-1}{\cos x}=\frac{-1}{\frac{\sqrt{2}}{2}}=-\sqrt{2}$$

$$\lim_{x\to \frac{3\pi}{4}}\frac{\tan^2 x-1}{\cos 2x}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to \frac{3\pi}{4}}\frac{\tan^2 x-1}{\cos 2x}=\frac{(\underset{\frac{\sin x}{\cos x}}{\tan x}+1)(\tan x-1)}{\cos 2x}=\frac{\left(\frac{\sin x+\cos x}{\cos x}\right)\left(\frac{\sin x-\cos x}{\cos x}\right)}{\underset{\cos^2 x-\sin^2 x}{\cos 2x}}$$ ۱۰

$$=\frac{\overset{-1}{\cancel{\sin^2 x-\cos^2 x}}}{\cos^2 x(\cancel{\cos^2 x-\sin^2 x})}=\lim_{x\to \frac{3\pi}{4}}\frac{-1}{\cos^2 x}=\frac{-1}{(\frac{\sqrt{2}}{2})^2}=\frac{-1}{\frac{1}{2}}=-2$$