تکلیف ۳۰ — فاطمه شکرانی — (یازدهم ر ت ۸)

۱)

$$\lim_{x\to 1}\frac{4x^2-7x+3}{5x^2-8x+3}=\frac{(x-1)(4x-3)}{(x-1)(5x-3)}=\frac{4-3}{5-3}=\frac{1}{2}$$

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۲)

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

$$0^+ \rightarrow \frac{(1-3x)-(3x+1)}{x}=\frac{-6x}{x}=-6$$

$$0^- \rightarrow \frac{(1-3x)-(3x+1)}{x}=\frac{-6x}{x}=-6$$

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۳)

$$\lim_{x\to 4}\underbrace{\frac{x-4}{\sqrt{x}-2}}_{\frac{0}{0}}=\frac{(\cancel{\sqrt{x}-2})(\sqrt{x}+2)}{\cancel{\sqrt{x}-2}}=4$$

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۴)

$$\lim_{x\to 2}\frac{x-\sqrt{2x}}{2x^2-x-6}=\frac{0}{0}\rightarrow\frac{x-\sqrt{2x}}{2x^2-x-6}\times\frac{x+\sqrt{2x}}{x+\sqrt{2x}}=\frac{\overbrace{x^2-2x}^{x(\cancel{x-2})}}{\underbrace{(2x^2-x-6)}_{(\cancel{x-2})(2x+3)}(4)}=\frac{2}{28}=\frac{1}{14}$$

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۵)

$$\lim_{x\to 1}\underbrace{\frac{1-\sqrt{x}}{2-\sqrt{5-x}}}_{\frac{0}{0}}\times\frac{1+\sqrt{x}}{1+\sqrt{x}}\times\frac{2+\sqrt{5-x}}{2+\sqrt{5-x}}=\underbrace{\frac{1-x}{\underbrace{4-5+x}_{x-1}}}_{-1}\times\underbrace{\frac{4}{2}}_{2}=\boxed{-2}$$

$$\lim_{x\to 4} \frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3} \times \frac{\sqrt{3x+4}+4}{\sqrt{3x+4}+4} \times \frac{\sqrt[3]{(5x+7)^2}+9+3\sqrt[3]{5x+7}}{\sqrt[3]{(5x+7)^2}+9+3\sqrt[3]{5x+7}} = \frac{3x-12}{5x-20} \times \frac{27}{8} =$$

$\frac{0}{0}$

$$\frac{3\cancel{(x-4)}}{5\cancel{(x-4)}} \times \frac{27}{8} = \frac{81}{40}$$

۶

$$\lim_{x\to 1} \frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1} \times \frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt{3x+\sqrt{x}}+2} \times \frac{\sqrt[3]{x^2}+1+\sqrt[3]{x}}{\sqrt[3]{x^2}+1+\sqrt[3]{x}} = \frac{\overbrace{3x+\sqrt{x}-4}^{(\sqrt{x}-1)(3\sqrt{x}+4)}}{\underbrace{x-1}_{(\sqrt{x}-1)(\sqrt{x}+1)}} \times \frac{3}{4}$$

$\frac{0}{0}$

$$\frac{3\sqrt{1}+4}{\sqrt{1}+1} \times \frac{3}{4} = \frac{7}{2} \times \frac{3}{4} = \frac{21}{8}$$

۷

$$\lim_{x\to \pi} \frac{1+\cos^3 x}{\sin^2 x} = \frac{0}{0} \to \frac{\cancel{(1+\cos x)}(1+\cos^2 x-\cos x)}{\underbrace{(1-\cos^2 x)}_{\cancel{(1+\cos x)}(1-\cos x)}} = \boxed{\frac{3}{2}}$$

۸

$$\lim_{x\to \frac{\pi}{4}} \frac{1-\tan x}{\sin x-\cos x} = \frac{0}{0} \to \frac{1-\frac{\sin x}{\cos x}}{\sin x-\cos x} = \frac{\frac{\cos x-\sin x}{\cos x}}{(\sin x-\cos x)} = \frac{-1}{\cos x} = \frac{-2}{\sqrt{2}} = -\sqrt{2}$$

۹

$$\lim_{x\to \frac{3\pi}{4}} \frac{\tan^2 x-1}{\cos 2x} = \frac{0}{0} \to \frac{\frac{\sin^2 x}{\cos^2 x}-1}{\cos^2 x-\sin^2 x} = \frac{\frac{\sin^2 x-\cos^2 x}{\cos^2 x}}{\cos^2 x-\sin^2 x} =$$

۱۰

$$\frac{-1}{\cos^2 x} = \frac{-1}{\frac{1}{2}} = -2$$