ریاضیات ۳ ۱۷/۷۵ گروه یازدهم دفتر A تکلیف شماره ۳۰

۱) $\lim_{x\to1}\frac{4x^2-7x+3}{5x^2-8x+3}=\lim_{x\to1}\frac{\cancel{(x-1)}(4x-3)}{\cancel{(x-1)}(5x-3)}=\frac{1}{2}$

۲) $\lim_{x\to0}\frac{|3x-1|-|3x+1|}{x}=\frac{0}{0}$

$\lim\frac{-(3x-1)-(3x+1)}{x}=\lim\frac{-3x+\cancel{1}-3x-\cancel{1}}{x}=\lim\frac{-6x}{x}=-6$

۳) $\lim_{x\to4}\frac{x-4}{\sqrt{x}-2}\times\frac{\sqrt{x}+2}{\sqrt{x}+2}=\lim_{x\to4}\frac{\cancel{(x-4)}\sqrt{x}+2}{\cancel{x-4}}=2+2=4$

۴) $\lim_{x\to2}\frac{x-\sqrt{2x}}{2x^2-x-6}=\lim\frac{x-\sqrt{2x}}{(x-2)(2x+3)}\times\frac{x+\sqrt{2x}}{x+\sqrt{2x}}=\lim\frac{x^2-2x\quad x\cancel{(x-2)}}{\cancel{(x-2)}(2x+3)(x+\sqrt{2x})}$

$=\frac{2}{\underbrace{(4+3)}_{7}\underbrace{(2+2)}_{4}}=\frac{\cancel{2}}{\cancel{4}\times7}=\frac{1}{14}$

۵) $\lim_{x\to1}\frac{1-\sqrt{x}}{2-\sqrt{5-x}}=\lim\frac{1-\sqrt{x}}{2-\sqrt{5-x}}\times\frac{1+\sqrt{x}}{1+\sqrt{x}}\times\frac{2+\sqrt{5-x}}{2+\sqrt{5-x}}=$

$\lim\frac{(1-x)}{\underbrace{4-(5-x)}_{4-5+x}}\times\frac{2+\sqrt{5-x}}{1+\sqrt{x}}=\lim\frac{\overset{-1}{\cancel{1-x}}}{\cancel{x-1}}\times\frac{2+\sqrt{5-x}}{1+\sqrt{x}}=-1\times\frac{4}{2}=-2$

۶) $\lim_{x\to4}\frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-\underset{\sqrt[3]{27}}{3}}\times\frac{\sqrt{3x+4}+4}{\sqrt{3x+4}+4}\times\frac{(\sqrt[3]{5x+7})^2+3\sqrt[3]{5x+7}+9}{(\sqrt[3]{5x+7})^2+3\sqrt[3]{5x+7}+9}=$ ۱/۵

$\lim\frac{\overbrace{3x-12}^{3\cancel{(x-4)}}}{\underbrace{(5x+7)-27}_{\substack{5x-20\\5\cancel{(x-4)}}}}\times\frac{(\sqrt[3]{5x+7})^2+3\sqrt[3]{5x+7}+9}{\sqrt{3x+4}+4}=\frac{3}{5}\times\frac{\sqrt[3]{27}^2+3\sqrt[3]{27}+9}{\sqrt{16}+4}=$

$\frac{3}{5}\times\frac{27}{8}=\frac{\cancel{63}}{40}\quad\frac{81}{40}$

۷) $\lim_{x\to1}\frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}=\frac{0}{0}\xrightarrow{hop}\lim_{x\to1}\frac{\frac{(3+\frac{1}{2\sqrt{x}})}{2\sqrt{3x+\sqrt{x}}}}{\frac{1}{3\sqrt[3]{x^2}}}=\frac{7}{8}$ ۰/۵

۸) $\lim_{x\to\pi}\frac{1+\cos^3x}{\sin^2x}=\lim\frac{\cancel{(1+\cos x)}(1-\cos x+\cos^2x)}{\underset{(1-\cos x)\cancel{(1+\cos x)}}{(1-\cos^2x)}}=\lim_{x\to\pi}\frac{1-\cos x+\cos^2x}{1-\cos x}$

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

۷) پاسخ صحیح → $\lim_{x\to1}\frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}\times\frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt[3]{x^2}+1+\sqrt[3]{x}}\times\frac{3}{4}$

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

$$\lim_{x\to\frac{\pi}{۴}} \frac{۱-\tan x}{\sin x-\cos x} = \lim_{x\to\frac{\pi}{۴}} \frac{۱-\frac{\sin x}{\cos x}}{\sin x-\cos x} = \lim \frac{\cancel{\cos x-\sin x}}{-\cos x\,(\cancel{\cos x-\sin x})} = \frac{۱}{-\frac{\sqrt{۲}}{۲}} = -\frac{۲}{\sqrt{۲}}$$

۵

$$\lim_{x\to\frac{۳\pi}{۴}} \frac{\tan^۲ x-۱}{\cos ۲x} = \frac{\tilde{0}}{\tilde{0}} \longrightarrow \lim_{x\to\frac{۳\pi}{۴}} \frac{\tan^۲ x-۱}{\cos ۲x} = \lim \frac{\frac{\sin^۲ x-\cos^۲ x}{\cos^۲ x}}{\frac{\cos^۲ x-\sin^۲ x}{۱}} =$$

۱,۷۵

$$\lim \frac{\cancel{\sin^۲ x-\cos^۲ x}}{-\cos^۲ x\,(\cancel{\sin^۲ x-\cos^۲ x})} = \lim \frac{-۱}{\cos^۲ x} = -۲$$

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