آرمین ایزدی — تکلیف ۳۰ — کلاس A

۱-

$$\lim_{x\to 1}\frac{2x^3-\sqrt{x}+3}{3x^2-4x^{\frac{1}{2}}+1}=\frac{0}{0}\xrightarrow{\text{تجزیه}}\lim_{x\to 1}\frac{(2x^{\frac{1}{2}}-3)(x-1)}{(3x^{\frac{1}{2}}-1)(x-1)}=\frac{-3}{2}=\boxed{\frac{1}{2}}$$

۲-

$$\lim_{x\to 0}\frac{|1+x^3|-|1-x^3|}{x}\begin{cases}\xrightarrow{0^+}\dfrac{(1+x^3)-(1+x^3)}{x}=\dfrac{x^3}{x}=-6\\ \xrightarrow{0^-}\dfrac{(1+x^3)-(1+x^3)}{x}=\dfrac{x^3}{x}=-6\end{cases}$$

۳-

$$\lim_{x\to 4}\frac{4-x}{2-\sqrt{x}}=\frac{0}{0}\xrightarrow{\text{تجزیه}}\lim_{x\to 4}\frac{4-x}{2-\sqrt{x}}\times\frac{2+\sqrt{x}}{2+\sqrt{x}}=\frac{(4-x)(2+\sqrt{x})}{4-x}=\boxed{4}$$

۴-

$$\lim_{x\to 4}\frac{x-\sqrt{3x+4}}{8-x-x^{\frac{3}{2}}}=\frac{0}{0}\xrightarrow{\text{تجزیه}}\lim_{x\to 4}\frac{x-\sqrt{3x+4}}{(2-x)(4+x^{\frac{1}{2}})}\times\frac{x+\sqrt{3x+4}}{x+\sqrt{3x+4}}=\frac{x^2-3x-4}{(2-x)(4+x^{\frac{1}{2}})(x+\sqrt{3x+4})}=\frac{(x-4)(x+1)}{(2-x)(4+x^{\frac{1}{2}})(x+\sqrt{3x+4})}$$

$$=\frac{x}{(4+x^{\frac{1}{2}})(x+\sqrt{3x+4})}=\frac{4}{8\times 4}=\boxed{\frac{1}{11}}$$

۵-

$$\lim_{x\to 1}\frac{1-\sqrt{x}}{x-3\sqrt{x}+2}=\frac{0}{0}\xrightarrow{\text{تجزیه}}\lim_{x\to 1}\frac{1-\sqrt{x}}{x-3\sqrt{x}+2}\times\frac{1+\sqrt{x}}{1+\sqrt{x}}\times\frac{x-3\sqrt{x}+4}{x-3\sqrt{x}+4}=\frac{(1-x)(x-3\sqrt{x}+4)}{(x-1)(1+\sqrt{x})}$$

$$=\frac{-x-3\sqrt{x}+4}{1+\sqrt{x}}=\frac{-4-4}{4}=\boxed{-2}$$

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۶-

$$\lim_{x\to 2}\frac{\sqrt{3x+2}-2}{\sqrt[3]{3x+2}-2}=\frac{0}{0}\xrightarrow{\text{رفع ابهام}}\lim_{x\to 2}\frac{\sqrt{3x+2}-2}{\sqrt[3]{3x+2}-2}\times\frac{\sqrt{3x+2}+2}{\sqrt{3x+2}+2}\times\frac{\sqrt[3]{(3x+2)^2}+2\sqrt[3]{3x+2}+4}{\sqrt[3]{(3x+2)^2}+2\sqrt[3]{3x+2}+4}$$

$$=\frac{3x+2-4}{3x-6}\times\frac{4}{3}=\frac{4(x-2)}{3(x-2)(x+2)}\times\frac{4}{3}=\frac{16}{9(4)}=\frac{4}{9}$$

۷-

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

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

$$=\frac{(x-1)(x+4)+(3x-8)}{(x-1)(\sqrt{3x+1}+3)}\times\frac{3}{4}=\frac{x+7}{\sqrt{3x+1}+3}\times\frac{3}{4}=\frac{7}{6}\times\frac{3}{4}=\frac{7}{8}$$

۸-

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

$$=\frac{3}{2}$$

۹-

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

۱۰-

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