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

−۷

$$\frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt{3x+\sqrt{x}}+2} = \frac{\cancel{(\sqrt{x}-1)}(3\sqrt{x}+4)(\sqrt[3]{x^2}+\sqrt[3]{x}+1)}{\cancel{(\sqrt{x}-1)}(\sqrt{x}+1)(\sqrt{3x+\sqrt{x}}+2)} = \frac{7\times 3}{2\times 4} = \frac{21}{8}$$

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

۸

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

−۴

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

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

−۱۰

$$\frac{\frac{1-\cos 2x-1-\cos 2x}{1+\cos 2x}}{\cos 2x} = \frac{\frac{-2\cancel{\cos 2x}}{1+\cos 2x}}{\cancel{\cos 2x}} = \frac{-2}{1+\underset{0}{\cos 2x}}$$

$$= \boxed{-2}$$

۷) ج ۳/۴ $\rightarrow \lim_{x\to 1} \frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1} \times \frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt[3]{x^2}+1+\sqrt[3]{x}} \times \frac{3}{4}$

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

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

۲-

$$\lim_{x\to 0}\frac{|4x-1|-|3x+1|}{x}=\frac{1-4x-3x-1}{x}=\frac{-7\cancel{x}}{\cancel{x}}=-7$$

۳-

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

$$\xrightarrow{\text{HOP}}\frac{1-\frac{2}{2\sqrt{2x}}}{4x-1}=\frac{1}{14}$$

۴-

$$\lim_{x\to 2}\frac{x-\sqrt{2x}}{2x^2-x-6}=\frac{0}{0}\longrightarrow\frac{\sqrt{x}(\sqrt{x}-\sqrt{2})}{(x-2)(2x+3)}=\frac{\sqrt{x}\cancel{(\sqrt{x}-\sqrt{2})}}{\cancel{(\sqrt{x}-\sqrt{2})}(\sqrt{x}+\sqrt{2})(2x+3)}$$

۰/۵

$$\frac{\sqrt{x}}{(\sqrt{x}+\sqrt{2})(2x+3)}=\frac{\sqrt{2}}{2\sqrt{2}\times 2\sqrt{2}+3}=\frac{1}{4\sqrt{2}+6}\times\frac{4\sqrt{2}-6}{4\sqrt{2}-6}=\frac{4\sqrt{2}-6}{-4}=\frac{3}{2}-\sqrt{2}$$

۵-

$$\lim\frac{1-\sqrt{x}}{2-\sqrt{5-x}}=\frac{0}{0}\longrightarrow\frac{1-\sqrt{x}}{2-\sqrt{5-x}}\times\frac{1+\sqrt{x}}{1+\sqrt{x}}\times\frac{2+\sqrt{5-x}}{2+\sqrt{5-x}}$$

$$\frac{(1-x)(2+\sqrt{5-x})}{(x-1)(1+\sqrt{x})}=\frac{-4}{2}=-2$$

۶-

$$\lim_{x\to 4}\frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3}=\frac{0}{0}\longrightarrow\frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3}\times\frac{\sqrt{3x+4}+4}{\sqrt{3x+4}+4}\times\frac{\sqrt[3]{(5x+7)^2}+3\sqrt[3]{5x+7}+9}{''\quad''}$$

$$=\frac{(3x-12)\left(\sqrt[3]{(5x+7)^2}+3\sqrt[3]{5x+7}+9\right)}{(5x-20)(\sqrt{3x+4}+4)}$$

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