-7

$$\lim_{x\to 1}\frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}=\frac{0}{0}\longrightarrow \frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1}\times\frac{\sqrt[3]{x^2}+1+\sqrt[3]{x}}{\sqrt[3]{x^2}+1+\sqrt[3]{x}}\times\frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt{3x+\sqrt{x}}+2}=\frac{\cancel{(\sqrt{x}-1)}(3\sqrt{x}+4)(\sqrt[3]{x^2}+\sqrt[3]{x}+1)}{\cancel{(\sqrt{x}-1)}(\sqrt{x}+1)(\sqrt{3x+\sqrt{x}}+2)}=\frac{7\times 3}{2\times 4}=\frac{21}{4}$$

8.

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

-9

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

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

-10

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

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

$$=\boxed{-2}$$

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

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$$\lim_{x\to 0}\frac{|3x-1|-|3x+1|}{x}=\frac{1-3x-3x-1}{x}=\frac{-6\cancel{x}}{\cancel{x}}=-6$$

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

۴-

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

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

۵-

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

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

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

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

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