

$$\lim_{n \rightarrow 1} \frac{f_{n^2} - \sqrt{n+2}}{2n^2 - 1n + 2} = \frac{(n^2-2)(n-1)}{(2n-2)(n-1)} = \frac{f_{n^2-2}}{2n-2} = \frac{1}{2} \checkmark$$

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$$\lim_{n \rightarrow 0} \frac{|f_{n-1}| - |f_{n+1}|}{n} = \frac{-f_{n+1} - f_{n-1}}{n} = \frac{-4n}{n} = -4 \checkmark$$

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$$\lim_{n \rightarrow 4} \frac{n-4}{\sqrt{n}-2} = \frac{(\sqrt{n}-2)(\sqrt{n}+2)}{(\sqrt{n}-2)} = 4 \checkmark$$

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$$\lim_{n \rightarrow 2} \frac{n-\sqrt{2n}}{2n^2-n-4} \times \frac{n+\sqrt{2n}}{n+\sqrt{2n}} = \frac{n^2-2n}{(n-2)(2n+2)} \times \frac{n(n-2)}{(n-2)(2n+2)} = \frac{2}{2 \times 2} = \frac{1}{2} \checkmark$$

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$$\lim_{n \rightarrow 1} \frac{1-\sqrt{n}}{2-\sqrt{5-n}} \times \frac{(1+\sqrt{n})}{2} = \frac{1-n}{2-\sqrt{5-n}} \times \frac{1}{2} = \frac{(1-n)}{2-\sqrt{5-n}} \times \frac{1}{2} = \frac{(1-n)}{(n-1)} \times \frac{1}{2} = -\frac{1}{2} \checkmark$$

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$$\lim_{n \rightarrow \infty} \frac{\sqrt[3]{n+8} - 2}{\sqrt[3]{5n+1} - 2} \times \frac{\text{مزدوج صورت}}{\text{مزدوج صورت}} \times \frac{\text{فیل کنج}}{\text{فیل کنج}} = \frac{3n-12}{5n-2} \times \frac{2V}{1} \quad (2)$$

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$$\frac{3(n-4)}{5(n-4)} \times \frac{2V}{1} = \frac{11}{40} \quad \checkmark$$

$$\lim_{n \rightarrow 1} \frac{\sqrt[3]{n+\sqrt{n}} - 2}{\sqrt[3]{n}-1} \times \frac{\text{مزدوج صورت}}{\text{مزدوج صورت}} \times \frac{\text{فیل کنج}}{\text{فیل کنج}} = \frac{3n+\sqrt{n}-2}{n-1} \times \frac{2V}{1} \quad (2)$$

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$$= \frac{(\sqrt{n}-1)(3\sqrt{n}+2)}{(\sqrt{n}-1)(\sqrt{n}+1)} \times \frac{2}{2} = \frac{V}{2} \times \frac{2}{2} = \frac{21}{11} \quad \checkmark$$

$$\lim_{n \rightarrow \pi} \frac{1+\cos^2 n}{\sin^2 n} = \frac{(1+\cos n)(1+\cos^2 - \cos)}{1-\cos^2} = \frac{(1+\cos)(1+\cos^2 - \cos)}{(1-\cos)(1+\cos)} \quad (2)$$

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$$= \frac{1+\cos^2 n - \cos n}{1-\cos n} = \frac{1+1+1}{1+1} = \frac{3}{2} \quad \checkmark$$

$$\lim_{n \rightarrow \frac{\pi}{4}} \frac{1-\tan n}{\sin n - \cos n} = \frac{1 - \frac{\sin n}{\cos n}}{\sin n - \cos n} = \frac{\cos n - \sin n}{\cos n} = \frac{-1}{\cos n} \quad (2)$$

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$$= -\frac{1}{\frac{\sqrt{2}}{2}} = -\sqrt{2} \quad \checkmark$$

$$\lim_{n \rightarrow \frac{\pi}{4}} \frac{\tan^2 n - 1}{\cos^2 n} = \frac{\frac{\sin^2 n}{\cos^2 n} - 1}{\cos^2 n - \sin^2 n} = \frac{\sin^2 n - \cos^2 n}{\cos^2 n} = -\frac{1}{\cos^2 n} \quad (2)$$

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$$= -\frac{1}{\left(-\frac{\sqrt{2}}{2}\right)^2} = -2 \quad \checkmark$$