

$$\lim_{n \rightarrow 1} \frac{2n^2 - \sqrt{n+2}}{2n^2 - \sqrt{n+2}} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow 1} \frac{2n - \sqrt{2}}{1 \cdot n - \sqrt{2}} = \frac{1}{\sqrt{2}} \checkmark$$

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$$\lim_{n \rightarrow 0} \frac{|2n-1| - |2n+1|}{n} = \frac{1 - 2n - 2n - 1}{n} = \frac{-4n}{n} = -4 \checkmark$$

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$$\lim_{n \rightarrow 4} \frac{n-4}{\sqrt{n}-2} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow 4} \frac{(\sqrt{n}-2)(\sqrt{n}+2)}{\sqrt{n}-2} = 4 \checkmark$$

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$$\lim_{n \rightarrow 2} \frac{n - \sqrt{2n}}{2n^2 - n - 4} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow 2} \frac{1 - \frac{\sqrt{2}}{2\sqrt{n}}}{2n-1} = \frac{1 - \frac{\sqrt{2}}{2\sqrt{2}}}{1} = \frac{1}{\sqrt{2}} \checkmark$$

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$$\lim_{n \rightarrow 1} \frac{1 - \sqrt{n}}{2 - \sqrt{5-n}} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow 1} \frac{1 - \frac{1}{\sqrt{n}}}{2 - \frac{1}{\sqrt{5-n}}} = \frac{1 - 1}{2 - \frac{1}{4}} = -2 \checkmark$$

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$$\lim_{n \rightarrow r} \frac{\sqrt[n]{n+r} - r}{\sqrt[n]{n+v} - r} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow r} \frac{\frac{1}{r} \frac{1}{\sqrt[n]{n+r}}}{\frac{1}{r} \frac{1}{\sqrt[n]{n+v}}} = \frac{1}{1} = 1 \quad \checkmark$$

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$$\lim_{n \rightarrow 1} \frac{\sqrt[n]{n} + \sqrt{n} - r}{\sqrt[n]{n} - 1} = \frac{0}{0} \xrightarrow[\text{HOP}]{n \rightarrow 1} \frac{\frac{1}{r} \frac{1}{\sqrt[n]{n}} + \frac{1}{2\sqrt{n}}}{\frac{1}{r} \frac{1}{\sqrt[n]{n}} - \frac{1}{2\sqrt{n}}} = \frac{1/2}{1/2} = 1 \quad \checkmark$$

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

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$$\lim_{n \rightarrow \frac{\pi}{2}} \frac{1 - \tan n}{\sin n - \cos n} = \frac{1 - \frac{\sin n}{\cos n}}{\sin n - \cos n} = \frac{\frac{\cos n - \sin n}{\cos n}}{\sin n - \cos n} = \frac{-1}{\cos n} \cdot \frac{1}{\frac{1}{\sqrt{2}}} = -\sqrt{2} \quad \checkmark$$

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

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