

Evaluate the following limits.

$$1. \lim_{x \rightarrow 4} \frac{3x^2 + 10x - 8}{x^2 + 3x - 4} = \frac{14}{5}$$

Factoring

$$2. \lim_{h \rightarrow 3} \frac{h^2 - h - 6}{\sqrt{5h-6} - \sqrt{h+6}}$$

$$= \lim_{h \rightarrow 3} \frac{(h-3)(h+2)}{\sqrt{5h-6} - \sqrt{h+6}} \cdot \frac{\sqrt{5h-6} + \sqrt{h+6}}{\sqrt{5h-6} + \sqrt{h+6}}$$

$$= \lim_{h \rightarrow 3} \frac{(h-3)(h+2)(\sqrt{5h-6} + \sqrt{h+6})}{4(h-3)}$$

$$= 15/2$$

$$\begin{aligned}
 & 3. \quad \lim_{x \rightarrow -1} \left[\frac{7}{x^2 + 3x + 2} - \frac{x+8}{x+1} \right] \\
 & = \lim_{x \rightarrow -1} \frac{-1(x+1)(x+2)}{(x+1)(x+2)} \\
 & = \lim_{x \rightarrow -1} \frac{-(x+2)}{(x+2)} \\
 & = \frac{-(8)}{1} \\
 & = -8 \quad \square
 \end{aligned}$$

$$\left\{ \begin{aligned}
 & \frac{7}{(x+2)(x+1)} - \frac{x+8}{(x+1)(x+2)} \\
 & \frac{7 - (x^2 + 10x + 16)}{(x+1)(x+2)} \\
 & \text{Scrap work!}
 \end{aligned} \right.$$

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$$\begin{aligned}
 & 4. \quad \lim_{t \rightarrow -4} \frac{2t^2 + 7t - 4}{t^3 + 6t^2 + 9t + 4} \\
 & = \lim_{t \rightarrow -4} \frac{(2t-1)(t+4)}{(t+1)(t+1)(t+4)} \\
 & = \lim_{t \rightarrow -4} \frac{2t-1}{(t+1)^2} \\
 & = -1 \quad \square
 \end{aligned}$$

$$\left\{ \begin{aligned}
 & t = -1 \mid \begin{array}{r} 1 \quad 6 \quad 9 \quad 4 \\ \downarrow -1 \quad -5 \quad -4 \\ 1 \quad 5 \quad 4 \quad \overline{00} \end{array} \\
 & t^2 + 5t + 4 \\
 & (t+1)(t+4)
 \end{aligned} \right.$$

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5. $\lim_{x \rightarrow -1} \frac{\frac{x+1}{x+3} - 2}{x+1}$

$$= \lim_{x \rightarrow -1} \frac{3(x+1)}{2(x+3)(x+1)}$$

$$= \lim_{x \rightarrow -1} \frac{3}{2(x+3)}$$

$$= \frac{3}{4} \quad \square$$

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6. $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{\sqrt{x+2} - 2}$

$$= \lim_{x \rightarrow 2} \left(\frac{\sqrt{x} - \sqrt{2}}{\sqrt{x+2} - 2} \right) \left[\frac{\sqrt{x} + \sqrt{2}}{\sqrt{x} + \sqrt{2}} \right]$$

$$= \lim_{x \rightarrow 2} \frac{(x-2)}{(\sqrt{x+2} - 2)(\sqrt{x} + \sqrt{2})} \left[\frac{\sqrt{x+2} + 2}{\sqrt{x+2} + 2} \right]$$

$$= \lim_{x \rightarrow 2} \frac{(x-2)(\sqrt{x+2} + 2)}{(\sqrt{x+2} - 2)(x-2)}$$

$$= \lim_{x \rightarrow 2} \frac{\sqrt{x+2} + 2}{\sqrt{x} + \sqrt{2}}$$

$$= \frac{4}{2\sqrt{2}}$$

$$= \frac{2}{\sqrt{2}} \quad \square$$

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7. $\lim_{x \rightarrow 0} \frac{\sqrt{x+1}-1}{2-\sqrt{4-x}} =$

8. For what values of c , will $\lim_{x \rightarrow c} \frac{x^3 - 2x^2 - 5x + 6}{x - c}$ exist?

$$\begin{array}{r|rrrr} 1 & 1 & -2 & -5 & 6 \\ & \downarrow & & & \\ & 1 & -1 & -6 & 0 \end{array}$$

$$x^2 - x - 6$$

$$(x-3)(x+2)$$

$$\therefore \lim_{x \rightarrow c} \frac{(x-1)(x-3)(x+2)}{(x-c)}$$

$$c = 1, 3, -2$$

3.

$$4. \quad \lim_{x \rightarrow 5} \frac{\sqrt{3x+1}-4}{x-5}$$

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$$5. \quad \lim_{x \rightarrow 0} \frac{x^3-1}{x^2+1}$$

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6. $\lim_{t \rightarrow 9} \frac{9-t}{3-\sqrt{t}}$