

Determine the Limit by substitution

$$7A) \lim_{x \rightarrow -1} 2x^2(5x+2) = -6$$

$$\frac{2(-1)^2(5(-1)+2)}{2(-5+2)}$$

$$13A) \lim_{x \rightarrow 30} (x-3)^{1/3} = 27^{1/3} \\ = \sqrt[3]{27} \\ = 3$$

Determine the limit algebraically and support graphically.

$$20A) \lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x^2 - 16} = \frac{4^2 - 3(4) - 4}{4^2 - 16} = \frac{0}{0} \text{ HOLE}$$

$$\cancel{x^2 - 3x - 4} \quad \cancel{(x-4)(x+1)} \\ \cancel{x^2 - 16} \quad \cancel{(x-4)(x+4)}$$

$$\boxed{\lim_{x \rightarrow 4} \frac{(x+1)}{(x+4)} = \frac{5}{8}}$$

Hole $(4, \frac{5}{8})$

$$22A) \lim_{x \rightarrow 0} \frac{\frac{1}{x+3} - \frac{1}{3}}{x} =$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{x+3} - \frac{1}{3}}{x} = \frac{0}{0} \text{ Indeterminate Form}$$

$$\cdot \quad \frac{\frac{1}{x+3} - \frac{1}{3}}{x} = \frac{\frac{3}{3(x+3)} - \frac{(x+3)}{3(x+3)}}{x} = \frac{\left(\frac{-x}{3(x+3)}\right)}{x}$$

$$\frac{-x}{3(x+3)} \div x = \frac{-x}{3(x+3)} \cdot \frac{1}{x} = \frac{-1}{3(x+3)}$$

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

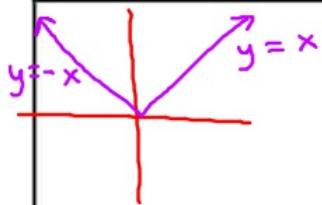
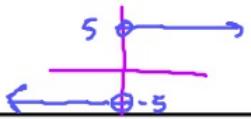
$$\boxed{\lim_{x \rightarrow 0} \frac{-1}{3(x+3)} = -\frac{1}{9}}$$

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$$\frac{\frac{1}{x+3} - \frac{1}{3}}{x} = \frac{\left(\frac{1}{x+3}\right)}{x} - \frac{\left(\frac{1}{3}\right)}{x} = \frac{(3)\frac{1}{x(x+3)}}{(3)x(x+3)} - \frac{1}{3x} \frac{(x+3)}{(x+3)} \\ = \frac{3}{3x(x+3)} - \frac{(x+3)}{3x(x+3)}$$

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

$$y = |x|$$



Determine the limit by substitution

A) $\lim_{x \rightarrow 0^-} \frac{5x}{-x} = -5$

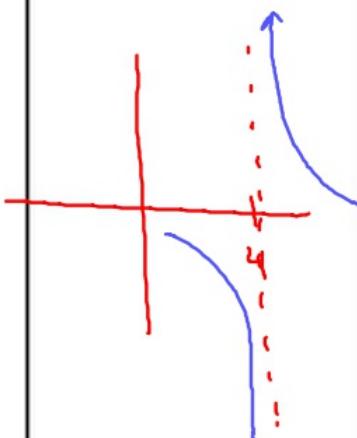
$$\lim_{x \rightarrow 0^-} \frac{5x}{|x|} = \frac{0}{0}$$

B) $\lim_{x \rightarrow 0^+} \frac{5x}{x} = 5$

$$\lim_{x \rightarrow 0^+} \frac{5x}{|x|} = \frac{5}{1}$$

Determine the limit by substitution and support graphically.

30A) $\lim_{x \rightarrow 4} \frac{x^2 - 4}{x^2 - 16} = \frac{16 - 4}{16 - 16} = \frac{12}{0}$ Vertical Asy



$$\frac{x^2 - 4}{x^2 - 16}$$

$$x = 3.9$$

$$\frac{3.9^2 - 4}{3.9^2 - 16} = \frac{+}{-} = \text{neg}$$

$$\frac{x^2 - 4}{x^2 - 16}$$

$$x = 4.1$$

$$\frac{4.1^2 - 4}{4.1^2 - 16} = \frac{+}{+} = \text{pos}$$

$\lim_{x \rightarrow 4} \frac{x^2 - 4}{x^2 - 16} = \text{DNE}$

Use properties of limits to determine each limit

Assume that $\lim_{x \rightarrow 1} f(x) = 10$ and $\lim_{x \rightarrow 1} g(x) = 5$

A) $\lim_{x \rightarrow 1} (f(x) + 3) = 10 + 3 = 13$

$$f(1) + 3$$

B) $\lim_{x \rightarrow 1} (xg(x)) = 1 \cdot g(1) = 1 \cdot 5 = 5$

C) $\lim_{x \rightarrow 1} (f^2(x)) = f^2(1) = [f(1)]^2$

$$= 10^2$$

$$= 100$$

D) $\lim_{x \rightarrow 1} \frac{f(x)}{g(x) + 2} = \frac{f(1)}{g(1) + 2} = \frac{10}{7}$