

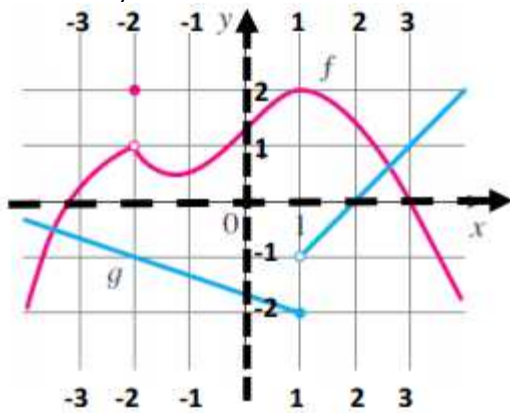
I. Limit Laws

$$\lim_{x \rightarrow a} [f(x) + g(x)] = \lim_{x \rightarrow a} f(x) + \lim_{x \rightarrow a} g(x) \quad \lim_{x \rightarrow a} [f(x) - g(x)] = \lim_{x \rightarrow a} f(x) - \lim_{x \rightarrow a} g(x)$$

$$\lim_{x \rightarrow a} [f(x)g(x)] = \lim_{x \rightarrow a} f(x) \cdot \lim_{x \rightarrow a} g(x) \quad \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{\lim_{x \rightarrow a} f(x)}{\lim_{x \rightarrow a} g(x)} \quad \lim_{x \rightarrow a} [cf(x)] = c \lim_{x \rightarrow a} f(x)$$

$$\lim_{x \rightarrow a} [f(x)]^n = \left[\lim_{x \rightarrow a} f(x) \right]^n \quad \lim_{x \rightarrow a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \rightarrow a} f(x)}$$

Use the limit laws and the graphs of f and g in the figure below to evaluate the following limits, if they exist.



1. $\lim_{x \rightarrow -2} [f(x) + 5g(x)]$
2. $\lim_{x \rightarrow 1} [f(x)g(x)]$
3. $\lim_{x \rightarrow 2} \frac{f(x)}{g(x)}$
4. $\lim_{x \rightarrow 1} [f(x)]^3$

II. Special Limits

$$\lim_{x \rightarrow a} c = c \quad \lim_{x \rightarrow a} x = a \quad \lim_{x \rightarrow a} x^n = a^n \quad \lim_{x \rightarrow a} \sqrt[n]{x} = \sqrt[n]{a} \quad \lim_{x \rightarrow a} f(x) = f(a)$$

Evaluate the following limits.

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

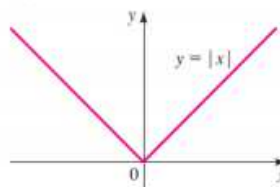
$$5. \lim_{x \rightarrow 1} \frac{x-1}{x^2-1}$$

$$6. \lim_{h \rightarrow 0} \frac{(3+h)^2 - 9}{h}$$

$$7. \lim_{t \rightarrow 0} \frac{\sqrt{t^2+9} - 3}{t^2}$$

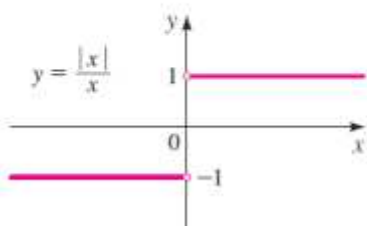
8. Show that

$$\lim_{x \rightarrow 0} |x| = 0$$



9. Prove that

$$\lim_{x \rightarrow 0} \frac{|x|}{x} = \text{DNE}$$



10. Given $f(x) = \begin{cases} \sqrt{x-4} & \text{if } x > 4 \\ 8-2x & \text{if } x < 4 \end{cases}$ find $\lim_{x \rightarrow 4} f(x)$

