

Bellwork 9/13

- ① Evaluate

$$\lim_{x \rightarrow 5} \left(\frac{x^2 + x - 30}{5 - x} \right)$$

- ② Find $\lim_{x \rightarrow 0} f(x)$ where

$$f(x) = \begin{cases} \sqrt{4 - x} & \text{if } x < 0 \\ x + 2 & \text{if } x \geq 0 \end{cases}$$

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Bellwork 9/13 - Solutions

1

$$\lim_{x \rightarrow 5} \left(\frac{x^2 + x - 30}{5 - x} \right) = \boxed{-11}$$

2

$$f(x) = \begin{cases} \sqrt{4 - x} & \text{if } x < 0 \\ x + 2 & \text{if } x \geq 0 \end{cases}$$

$$\begin{aligned} \lim_{x \rightarrow 0^-} f(x) &= 2 & \lim_{x \rightarrow 0^+} f(x) &= 2 \\ \implies \lim_{x \rightarrow 0} f(x) &= \boxed{2} \end{aligned}$$

Exercise 1

$$f(2) = 3$$

$$g(2) = -6$$

$$h(2) = -3$$

$$\lim_{x \rightarrow 2} f(x) = 4$$

$$\lim_{x \rightarrow 2} g(x) = -6$$

$$\lim_{x \rightarrow 2} h(x) = 2$$

What is $\lim_{x \rightarrow 2} [h(x)(5f(x) + g(x))]$?

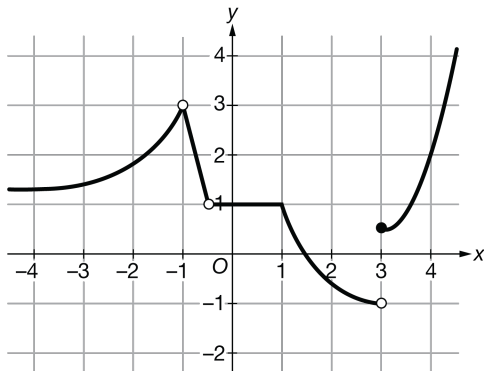
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Exercise 1 - Solution

Since all of the limits are defined, we can directly rewrite the expression and substitute:

$$\begin{aligned} & \lim_{x \rightarrow 2} [h(x)(5f(x) + g(x))] \\ &= \lim_{x \rightarrow 2} h(x) \cdot \left[5 \lim_{x \rightarrow 2} f(x) + \lim_{x \rightarrow 2} g(x) \right] \\ &= 2(5 \cdot 4 - 6) \\ &= \boxed{28} \end{aligned}$$

Exercise 2



Graph of f

What is $\lim_{x \rightarrow -1} f[f(x)]$?

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Exercise 2 - Solution

$$\lim_{x \rightarrow -1} f(x) = 3$$

$$\implies \lim_{x \rightarrow -1} f[f(x)]$$

$$= \lim_{x \rightarrow 3} f(x)$$

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

$$\implies \lim_{x \rightarrow -1} f[f(x)] \quad \boxed{\text{DNE}}$$