

**Problems:**

1. Find the values.

- (a) $\arctan(\sqrt{3})$
- (b) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$
- (c) $\sin\left(2\sin^{-1}\left(\frac{3}{4}\right)\right)$

2. Simplify the expressions.

- (a) $\tan(\sin^{-1}(x))$
- (b) $\cos(\arctan(x))$

3. Sketch the graph of the function

$$f(x) = \begin{cases} 1+x & \text{if } x < -1 \\ x^2 & \text{if } -1 \leq x < 1 \\ 2-x & \text{if } x \geq 1 \end{cases}$$

Find $\lim_{x \rightarrow -1^-} f(x)$, $\lim_{x \rightarrow -1^+} f(x)$, $\lim_{x \rightarrow 1^-} f(x)$, and $\lim_{x \rightarrow 1^+} f(x)$. Does $\lim_{x \rightarrow -1} f(x)$ exist? Does $\lim_{x \rightarrow 1} f(x)$ exist?

4. Find the limits.

(a)

$$\lim_{x \rightarrow -3^-} \frac{x+1}{x+3}$$

(b)

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

(c)

$$\lim_{x \rightarrow 0^+} \ln(\sin(x))$$

(d)

$$\lim_{x \rightarrow 2^-} \frac{x^2 - 2x}{x^2 - 4x + 4}$$

5. Compute the limits.

(a)

$$\lim_{x \rightarrow -3} \frac{x^2 + 3x}{x^2 - x - 12}$$

(b)

$$\lim_{h \rightarrow 0} \frac{(2+h)^3 - 8}{h}$$

(c)

$$\lim_{t \rightarrow 1} \frac{\sqrt{2-t} - 1}{t-1}$$

(d)

$$\lim_{x \rightarrow 0} x^4 \cos\left(\frac{2}{x}\right)$$

6. Let

$$g(x) = \frac{x^2 + x - 6}{|x-2|}.$$

Find $\lim_{x \rightarrow 2^-} g(x)$, and $\lim_{x \rightarrow 2^+} g(x)$. Does $\lim_{x \rightarrow 2} g(x)$ exist? Sketch the graph of $g(x)$.