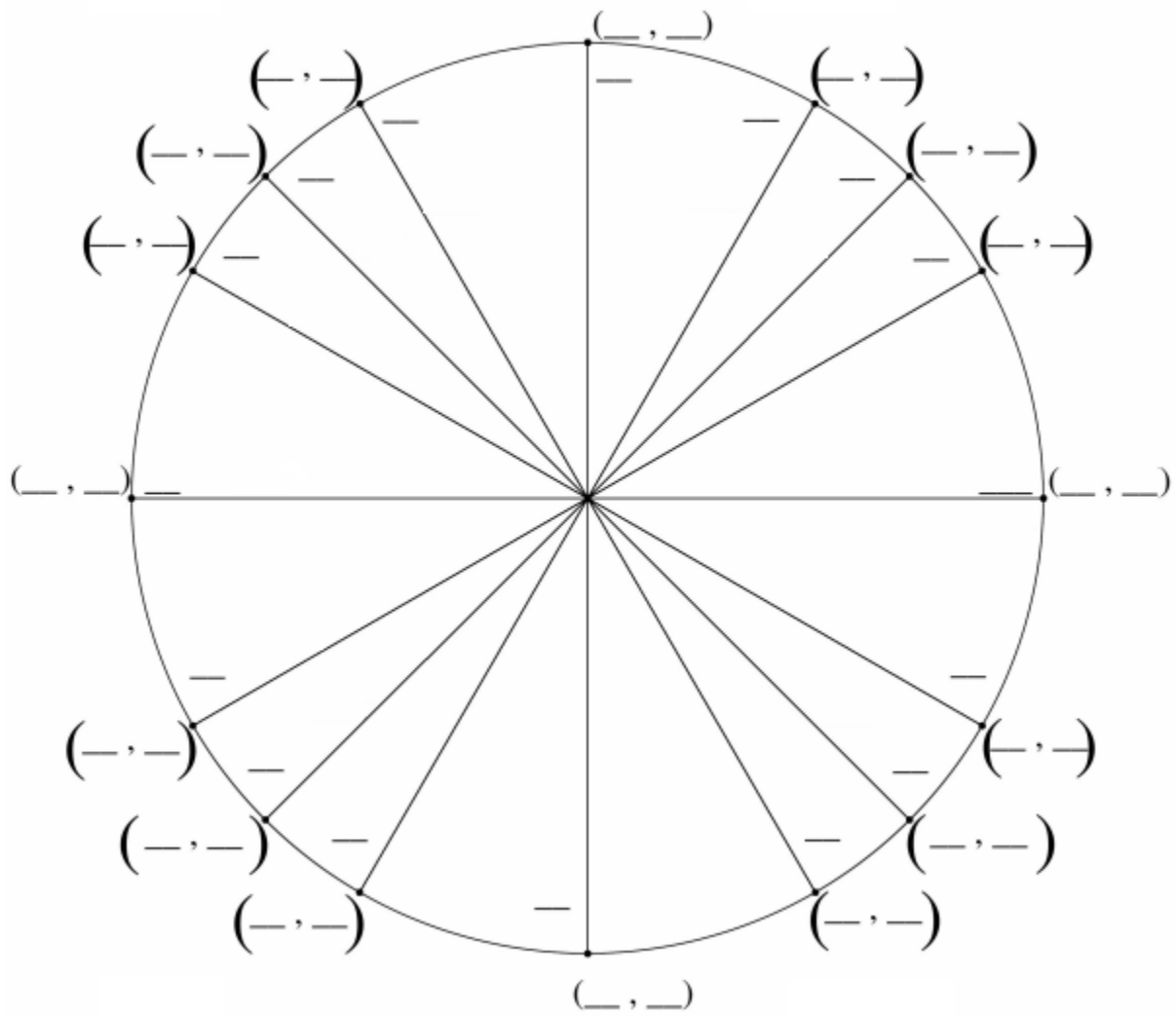


# Unit Circle



# Limits

Evaluate the following limits:

1.  $\lim_{x \rightarrow 10} 3$

6.  $\lim_{h \rightarrow 0} \frac{(x+h)^2 + 5(x+h) - x^2 - 5x}{h}$

2.  $\lim_{x \rightarrow 3} x^2 - 4x + 1$

7.  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

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

8.  $f(x) = \begin{cases} x + 2 & x \leq 6 \\ x^2 - 1 & x > 6 \end{cases}$   
 $\lim_{x \rightarrow 6} f(x)$

4.  $\lim_{x \rightarrow 0} \frac{\sqrt{9+x} - 3}{x}$

9.  $f(x) = \begin{cases} \sqrt{x-4} & x > 4 \\ 8 - 2x & x < 4 \end{cases}$   
 $\lim_{x \rightarrow 6} f(x)$

5.  $\lim_{h \rightarrow 0} \frac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h}$

10.  $\lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{1}{x^2 + x} \right)$

# Infinite Limits

Evaluate the following limits:

1.  $\lim_{x \rightarrow -5^+} \frac{2x - 11}{x + 5}$

3.  $\lim_{x \rightarrow 2} \frac{x + 8}{(x - 2)^2}$

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

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

# Limits at Infinity

## Horizontal Asymptotes

Let  $f(x) = \frac{ax^n + \dots + a_0}{bx^k + \dots + b_0}$

- If  $n > k$ ,  $\lim_{x \rightarrow \pm\infty} f(x) = \pm\infty$ .
- If  $n = k$ ,  $\lim_{x \rightarrow \pm\infty} f(x) = \frac{a}{b}$ .
- If  $n < k$ ,  $\lim_{x \rightarrow \pm\infty} f(x) = 0$ .

Evaluate the following limits:

1.  $\lim_{x \rightarrow \infty} 7$

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

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

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