Homework

1. What are the domain and range of the following functions?

   (a) $g(x) = \frac{1}{x}$

   (b) $f(x) = \sqrt{x-3}$

2. Let

$$f(x) = \begin{cases} x - 5 & x \geq 1 \\ -4x & x < 1 \end{cases}.$$

   Evaluate $\lim_{x \to 1} f(x)$

3. Compute:

$$\lim_{x \to 2} \frac{x^2 - 4}{x - 2}.$$

4. Evaluate:

$$\lim_{x \to 0} \frac{\sin(5x)}{x}.$$

5. Determine whether

$$f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0, \\ 1, & x = 0 \end{cases}$$

   is continuous at $x = 0$.

6. Find all points where

$$g(x) = \frac{x^2 - 1}{x - 1}$$

   is continuous.

7. Differentiate:

   (a) $f(x) = x^3 \sin x$

   (b) $g(x) = \ln(\sqrt{1 + x^2})$

8. Find the equation of the tangent line to

$$y = e^{2x}$$

   at $x = 0$.

9. Consider $f(x) = (x^2 - 4)^7$. Find and classify all local extrema.

10. Find the global max and min of $f(x) = x^3 - 7x + 6$ on $-4 \leq x \leq 2$.