1. Find all asymptotes or other points of discontinuity:
   \[ f(x) = \frac{5x^2 - 13x + 6}{x^2 - 4} \]

2. Continuous Function
   Is \( f(x) = \begin{cases} \frac{x-3}{x-5} \text{ continuous at } x=5? \\ 2x-8, x>5 \\ 3, x=5 \end{cases} \)

3. At what point is the removable discontinuity for \( f(x) = \frac{x^2 + 2x - 15}{x^2 + 4x - 5} \)?

4. Sketch a graph such that:
   \[ f(0) \text{ DNE} \quad \lim_{x \to -2^+} f(x) = \infty \text{ (DNE)} \]
   \[ \lim_{x \to 0} f(x) = 1 \]
   \[ \lim_{x \to -\infty} f(x) = 1 \]
   \[ (x-1) \text{ is a factor of the polynomial} \]

5. For what value of \( a \) and \( b \) will the function
   \[ f(x) = \begin{cases} ax + b, & x<4 \\ x^2 - x, & x \geq 4 \end{cases} \]
   be both continuous and differentiable at \( x=4 \)?

6. Average rate of change = slope of ______
   Instantaneous rate of change = slope of ______

7. What is the definition of derivative based on limits?

8. Derivatives fail to exist...
9. What is the slope of the tangent to curve \( y = 3x^2 - 9x + 2 \) at \( x = 2 \)?

What is the equation of the line tangent to the curve at \( x = 2 \)?

What is the equation of the line normal to the curve there?

10. [Linearization]

As we zoom in on a particular point, the tangent to the curve gives a good linear approximation to the curve at that point.

\[
f(x) = \frac{x^2}{3} - 3x
\]

What is the equation for the linearization to the curve at \( x = 3 \)?

Use it to approximate \( f(3.05) \)

11. Find \( \frac{dy}{dx} \) if \( x^2y^2 = x^2 - y^2 \)

12. Find \( f'(t) \) for \( f(t) = \frac{1}{2} e^{\sin 2t} \)

13. Find \( \frac{d}{dx} \arcsin x^4 \)

14. Find \( \frac{d}{dx} \arctan \frac{1}{x} \)

15. \( f(x) = 6x^3 - 2x^2 + 5 \) \( \Rightarrow \) (1, 9)

Find the derivative of the inverse of \( f(x) \) at \( x = 9 \)

16. Evaluate using L'Hopital's Rule (if applicable)

(a) \( \lim_{x \to 0} \frac{x^2}{e^x} \)

(b) \( \lim_{x \to 3} \frac{3-x}{x^2 - 9} \)

(c) \( \lim_{x \to 2} \frac{1}{x-2} \)