1. Let \( f \) be defined by
\[
f(x) = \begin{cases} 
5 - x^2, & \text{if } -1 < x < 1 \\
2(2 - x), & \text{if } x \geq 1.
\end{cases}
\]
(a) Sketch the graph of \( f \).
(b) Determine the domain and range of \( f \).
(c) Is \( f \) continuous at the points \( x = -1, 0, 1 \)? Verify your answer.

2. Using the properties of limits, find the following limits putting in each step:
   (a) \( \lim_{x \to 3} \frac{x^2 - 4x + 3}{x^2 - 9} \)
   (b) \( \lim_{x \to 2} \frac{x^2 - 4x + 3}{x^2 - 9} \)
   (c) \( \lim_{x \to 0} \frac{\tan(x)}{\sin(x)} \)

3. Using the definition of derivative and the properties of limits, compute the derivative of \( f \) at \( x = 2 \) where \( f \) is given by
\[
f(x) = x^2 + x - 3.
\]

4. Let
\[
f(x) = 2x^3 - 6x - 2.
\]
(a) Compute the slope of the tangent line to the graph of \( f \) when \( x = 1 \).
(b) Give the equation of the tangent line to the graph of \( f \) at the same point.
(c) For which values of \( x \) is the tangent line horizontal?

5. Using the properties of derivatives, determine the derivatives of each of the following functions:
   (a) \( g(x) = (2x^2 - 3)(1 - 2x + x^2) \)
   (b) \( f(x) = x^2e^x - 2x^3 \) \hspace{1cm} \text{(Hint: You can use } D_x(e^x) = e^x)\)

6. [EXTRA CREDIT]
Using the definition of ‘limit’, prove that
\[
\lim_{x \to 0} x^2 = 0.
\]