1. Find the derivatives of the following functions:
   a) \( x^3 \sin x \)
   b) \( \frac{17 \tan x}{x^3 - 4} \)
   c) \( \frac{23e^x}{x^3 + 33e^x} \)
   d) \( 2x^{-2} + 3\sqrt{x} - \frac{9}{x^4} \)

2. a) Compute \( \lim_{x \to 0} \frac{e^x - 1}{x} \) and \( \lim_{x \to 0} \frac{\sin x}{x} \).
   b) Compute \( \lim_{x \to 0} \frac{e^{5x} - 1}{3x} \) and \( \lim_{x \to 0} \frac{\sin 7x}{6x} \).
   c) Compute \( \lim_{x \to 0} \frac{(\sin(4x))^2 \sin 7x}{(e^{3x} - 1)^2 x (\cos(5x))} \).

3. Here is the graph of a function, \( F \). Label any points on the graph which occur in your discussion of the questions below.
   a) Where is \( F \) not continuous? Why?
   b) Where is \( F \) not differentiable? Why?
   c) Sketch a graph of \( F' \) wherever \( F' \) is defined.

4. Suppose that \( f(x) \) and \( g(x) \) are differentiable functions, and the following information is known about them:
   \( f(2) = -3 \quad f'(2) = 5 \quad g(2) = 1 \quad g'(2) = 2 \quad g(0) = 2 \quad g'(0) = 4 \)
   a) If \( F(x) = \frac{f(x)}{g(x)} \), compute \( F(2) \) and \( F'(2) \).
   b) If \( G(x) = x^3 f(x) - 7g(x) \), compute \( G(2) \) and \( G'(2) \).
   c) If \( H(x) = \frac{3 + e^x}{g(x)} \), compute \( H(0) \) and \( H'(0) \).

5. A graph of \( y = x^3 - 3x \) looks approximately like what’s shown to the right. The person who drew the graph carelessly forgot to show the axes and scales, etc. Use calculus to find the exact coordinates of the points \( A \) and \( B \) which are, as shown, at the top and bottom of the bumps on the graph.