1. Compute the derivative:

   - $f(x) = (x^2 + 1)(x^3 + 2x^2 + x)$

   - $g(x) = \dfrac{x^2 + 1}{x^3 + 2x^2 + x}$

2. Determine values for a and b such that the following function, $f(x)$, is continuous everywhere.

$$f(x) = \begin{cases} 2 & x \leq 1 \\ ax + b & 1 < x \leq 3 \\ -2 & x > 3 \end{cases}$$

3. Let $f(x) = \dfrac{e^x}{\sin(x)}$. What is the domain of f? What is $\lim\limits_{x \to \infty} f(x)$? Where are the discontinuities of $f(x)$? Try sketching a graph.

4. Let $f(x) = \sqrt{3x + 1}$.

   (a) What is the domain of $f(x)$?

   (b) Using the definition of the derivative, compute $f'(5)$.

   (c) Write the equation of the line tangent to the graph of $f(x)$ at $x = 5$.