1. Differentiate the following functions.
   a. (5 points) \( f(x) = x^3 + 2x + 1 \).
   b. (5 points) \( f(x) = (2x + 1)/(x^2 + 7) \).
   c. (5 points) \( f(x) = 1/\sin(x^3 + \cos(x)) \).
   d. (5 points) \( f(x) = 1/\sqrt{\cos(x^2 \sin x + 1)} \).

2. (20 points) Prove that
   \[
   \lim_{x \to a} x^3 + 2x = a^3 + 2a
   \]
   using the following limit laws: The product law, the sum law, the constant multiple law, and the law \( \lim_{x \to a} x = a \). State at each step which law you used.

3. (20 points) Use the limit definition of the derivative to prove that if \( f(x) = x^3 + x \), then \( f'(x) = 3x^2 + 1 \).

4. (20 points) A wheel is mounted to an axle and spins with a constant angular velocity of \( 2\pi \) radians per second. A fixed point on the rim of the wheel then has position given by \( (x(t), y(t)) \), where \( x(t) = \cos(t + \theta) \), and \( y(t) = \sin(t + \theta) \), for some fixed \( \theta \). For what time values \( t \) is the magnitude (i.e. absolute value) of the velocity of this particle in the \( x \)-direction greater than the magnitude of the velocity in the \( y \)-direction?

5. (20 points) Use the limit definition of the derivative to prove that \( f(x) = |x| \) is not differentiable at \( x = 0 \).