1. Use Intermediate Value Theorem to show that \( p(x) = x^4 + 7x^3 - 9 \) has at least 2 real roots. Between which integers do they lie?

2. Show that the equation \( x = \cos x \) has a solution on \([0, \pi]\).

3. Let \( f(x) \) be a continuous function on \( \mathbb{R} \) such that \( \lim_{x \to -\infty} f(x) = \lim_{x \to -\infty} f(x) = 0 \). Show that then \( f(x) \) is bounded on \( \mathbb{R} \).

4. Determine where each of the functions is differentiable.
   (a) \(|x| + |x + 1|\)
   (b) \(|\sin x|\)
   (c) \(\frac{1}{1 - e^x}\)

5. Show that the function \( f(x) = x^2 \cos(1/x) \) is differentiable everywhere, including \( x = 0 \). Show that the derivative is not continuous at \( x = 0 \).

6. Compute the derivatives of the following functions
   (a) \((x + 1)^{10}\)
   (b) \(\sqrt{1 - x^2}\)
   (c) \(\frac{1}{1 + x^2}\)
   (d) \(\sin(1 + 2x)\)

7. Given that \( h(x) = x^3 + 2x + 1 \) has an inverse function \( h^{-1}(x) \) defined everywhere on \( \mathbb{R} \), compute \((h^{-1})'(y)\) for \( y = h(0) \) and for \( y = h(2) \).

8. Use Mean Value Theorem to show that \( |\sin x - \sin y| \leq |x - y| \) for all \( x, y \in \mathbb{R} \).