Hand your completed quiz in before the due date. Do not forget to write down your name and student ID number. Marks will be awarded for this quiz based on the clarity of your answers. The marker will pay close attention to the logic of your answers. Please show all your working.

Q1. If \( h(x) = x + \sqrt{x} \), find \( h^{-1}(6) \).

Q2. Find a formula for the inverse of the function.
   (a) \( f(x) = 3 - 2x \).
   (b) \( f(x) = \frac{4x - 1}{2x + 3} \).
   (c) \( f(x) = 1 + \sqrt{2 + 3x} \).

Q3. Find \((f^{-1})'(a)\).
   (a) \( f(x) = 2x^3 + 3x^2 + 7x + 4, \ a = 4 \).
   (b) \( f(x) = x^3 + 3 \sin x + 2 \cos x \).
   (c) \( f(x) = \sqrt{x^3 + x^2 + x + 1} \).

Q4. Suppose \( f^{-1} \) is the inverse function of a differentiable function \( f \) and \( f(4) = 5, f'(4) = \frac{2}{3} \). Find \((f^{-1})'(5)\).

Q5. If \( f(x) = \int_3^x \sqrt{1 + t^3} \, dt \), find \((f^{-1})'(0)\).

Q6. Find the limit.
   (a) \( \lim_{x \to 3^+} \ln(x^2 - 9) \).
   (b) \( \lim_{x \to \infty} [\ln(2 + x) - \ln(1 + x)] \).

Q7. Differentiate the function.
   (a) \( f(x) = \sqrt{x} \ln x \).
   (b) \( f(x) = \ln \frac{a-x}{a+x} \).
   (c) \( f(x) = \sin(\ln x) \).

Q8. If \( f(x) = \frac{\ln x}{1+x^2} \), find \( f'(1) \).

Q9. If \( f(x) = \frac{\ln x}{x} \), find \( f''(e) \).