This test is closed book and closed notes. Calculators of any kind are not allowed. You must clearly show your work to receive credit. Unless otherwise stated, you do not need to simplify your answer.

1. Simplify $\cos(\sin^{-1}(\frac{x}{2}))$. (10 points)

2. Let $f(t) = \tan(\sin^{-1}(t))$. Find $f'(t)$. (10 points)

3. Let $f(x) = e^{\tan^{-1}(x)}$. Find $f'(x)$. (10 points)
4. Find \( \int \frac{dz}{9z^2 + 4} \). (10 points)

5. Evaluate the following limits. (10 points each)

a) \( \lim_{x \to 1} \frac{x^3 + 4x^2 + x - 6}{x^2 + 4x - 5} \).

b) \( \lim_{x \to \infty} x^2 e^{-x} \).

c) \( \lim_{x \to \infty} \left( 1 + \frac{2}{x} \right)^x \).
6. Evaluate the following integrals. (10 points each)

a) \( \int xe^{3x} \, dx. \)

b) \( \int e^x \cos x \, dx. \)

c) \( \int \ln x \, dx. \)