Math 105 - Quiz 1 - January 11, 2008

Instructions: Show all of your work and circle your final answers. Calculators are allowed, but notes and books are not.

1. (10 pts.) Use the method of u-substitution with \( u = \sin x \) to evaluate the indefinite integral \( \int e^{\sin x} \cos x \, dx \).

   If \( u = \sin x \), then \( \frac{du}{dx} = \cos x \), so \( du = \cos x \, dx \).

   Then \( \int e^{\sin x} \cos x \, dx = \int e^u \, du = e^u + C = \left[ e^{\sin x} + C \right] \)

2. (10 pts.) Evaluate the indefinite integral \( \int x^3(x^4 - 1)^5 \, dx \).

   Let \( u = x^4 - 1 \), so \( \frac{du}{dx} = 4x^3 \), so \( du = 4x^3 \, dx \).

   Then \( \frac{du}{4} = x^3 \, dx \), so

   \[
   \int x^3(x^4 - 1)^5 \, dx = \int u^5 \frac{du}{4} = \frac{1}{4} \int u^5 \, du
   \]

   \[
   = \frac{1}{4} \left( \frac{u^6}{6} + C \right) = \frac{u^6}{24} + C = \frac{(x^4 - 1)^6}{24} + C
   \]