Name: _____ _____ **/ 25**

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[2 points]** Use the Fundamental Theorem of Calculus to evaluate the following derivative:

$$\frac{d}{dx}\left(\int_x^7 \sqrt{|t+8|}\,dt\right)$$

2. **[12 points]** Evaluate the following indefinite integrals. Show your work and state whenever you use a substitution.

   a. $\int x^2(x^3-2)^2\,dx$

   b. $\int \sin x \cos x\,dx$

   c. $\int \frac{\ln x + 3}{x}\,dx$

3. [5 points] Find the area under the curve $f(x) = x^2 + 2x + e^x$ from $x = 0$ to $x = 3$. Use a definite integral, show all your work, and **simplify your final answer**.

4. [6 points] A ball is thrown upward from an initial height of 5 feet at an initial speed of 40 feet per second. Its upward velocity at t seconds is given by the equation $v(t) = -32t + 40$ feet per second.

a. Evaluate $\int_0^2 v(t)\,dt$.

b. Explain what the quantity $\int_0^2 v(t)\,dt$ represents. Give units.

c. Explain how would this answer change if the ball had been thrown from an initial height of 10 feet?