Test 0

June 30

Name:

1. Evaluate the following integral:

$$\int_1^{e^3} \frac{(\ln x)^2}{x} dx =$$

2. Find an antiderivative:

$$\int \sin(\pi t)\cos(\pi t)dt =$$

3. Put the following quantities in order, from least to greatest. Briefly explain your choices.

$$A = \int_0^{\pi/2} \cos(t)dt$$

$$B = \int_0^{\pi} \cos(t)dt$$

$$C = \int_0^{3} \cos(t)dt$$

$$D = \int_0^{6} \cos(t)dt$$

$$E = \int_0^{3\pi/2} \cos(t)dt$$

4. Let

$$K = \int_{-9}^{4} 3x^2 dx$$

(a) Give an approximation for K with 39 rectangles and left endpoints.

(b) Is your approximation an underestimate or an overestimate? Explain why.

(c) Express K as a limit of sums.

5. Do two of the following four problems:

(a) Find all points on the graph of the function

$$f(x) = 2\sin(x) + \sin^2(x)$$

at which the tangent line is horizontal.

(b) Find the derivative of the function $f(x) = x^3$ at $x = 1$ directly from the definition.

(c) Evaluate

$$\lim_{x \to \pi} \frac{e^{\sin x} - 1}{x - \pi}$$

(d) Find an equation of the tangent line to the curve $y = e^x \cos x$ at the point $(0, 1)$.

6. Let f be a differentiable, nonconstant, function with the property that

$$\int_0^x f(t)dt = [f(x)]^2$$

What function is f?