Math 106 **Quiz # 10** **17 Apr 08**

Name :____

Recitation Section :______________________________________

Solve the following problems. Show your work and use correct notation.

1. Evaluate the following expressions:

$$\text{a) } \int_0^{\ln 3} e^{2x} dx \qquad \text{b) } \frac{d}{dx}\int_0^{x^2} \cos(e^t)dt \qquad \text{c) } \int \sqrt{6-2s}dx$$

Solution:

(a) Taking the antiderivative and evaluating at the bounds,

$$\int_0^{\ln 3} e^{2x} dx = \left[\frac{1}{2}e^{2x}\right]_0^{\ln 3} = \frac{1}{2}\left[e^{2\ln 3} - e^0\right] = \frac{1}{2}\left[e^{\ln 3^2} - 1\right] = \frac{1}{2}\left[e^{\ln 9} - 1\right]$$

$$= \frac{1}{2}[9-1] = 4$$

(b) Make the substitution $u = x^2$, and using the chain rule and the fundamental theorem of calculus,

$$\frac{d}{dx}\int_0^{x^2} \cos(e^t)dt = \frac{d}{du}\int_0^{u} \cos(e^t)dt \cdot \frac{du}{dx} = cos(e^u) \cdot \frac{du}{dx} = cos(e^{x^2})2x$$

(c) Make the substitution $u = 6 - 2s$, where $ds = -du/2$, and take the antiderivative to get

$$\int \sqrt{6-2s}ds = -\int \frac{\sqrt{u}}{2}du = -\frac{2}{6}(u)^{3/2} = -\frac{1}{3}(6-2s)^{3/2}$$