Name:

Math 115 Practice Exam 3

1) Evaluate the following integrals.

a) $\int_1^3 4x^3 + 1 \; dx$

b) $\int \tan(x)\sec^2(x) \; dx$

c) $\int_{-1}^2 \frac{x^2+1}{\sqrt{2+x}} \; dx$

2) Find the area enclosed by the y-axis and the graphs of $y = \cos(x)$ and $y = \sin(x)$ for $x \geq 0$.

3) A rectangle is inscribed in a right triangle with legs of length 12 cm and 6 cm with two sides of the rectangle lying along the legs of the triangle.

a) Draw a picture that reflects this scenario.

b) Establish an equation in one variable for the area of the rectangle. (*Hint:* similarity)

c) Find the dimensions of the rectangle with the largest possible area satisfying the given conditions.

4) Consider the function $f(x) = \cos(\pi x) + 6x^3 + 12x$.

a) Using the Intermediate Value Theorem, show f has a real zero.

b) Show that f has exactly one real zero using the Mean Value Theorem.

c) Starting with $x_1 = -1/2$, apply Newton's method to find x_3.