Math 112 Exam 1

September 22, 2010

INSTRUCTIONS: This is a closed book, closed notes exam. You are not to provide or receive help from any outside source during the exam.

- Print your name clearly in the space provided.

- You may use a calculator.

HONOR STATEMENT:

I have neither given nor received help on this exam, and all of the answers are my own.

_____
Signature

Question	Points	Score
1	48	
2	12	
3	42	
Total:	102	

You may use the following formulas (if applicable):

$$\int \frac{dx}{\sqrt{1-x^2}} = \sin^{-1} x + C$$

$$\int \frac{dx}{x^2+1} = \tan^{-1} x + C$$

$$\int \frac{dx}{|x|\sqrt{x^2-1}} = \sec^{-1} x + C$$

1. Compute the following integrals.

   (a) [12 points] $\int \frac{\cos(\ln x)}{x} dx$

   (b) [12 points] $\int \frac{dx}{x\sqrt{4x^2-1}}$

(c) [12 points] $\int_0^2 \frac{dt}{4t+12}$

(d) [12 points] $\int \frac{(x^2-1)e^{x^2-2x}}{x+1} dx$

2. The isotope Thorium-234 has a half-life of 24.5 days.

    (a) [6 points] Find the equation which models the amount $y(t)$ of Thorium-234 at time t.

    (b) [6 points] At $t = 0$, a sample contains 2 kg of Thorium-234. How much remains after 365 days?

3. Find the volume of the solid obtained by rotating the region enclosed by the curves about the given axis.

   (a) [14 points] $y = 2x, y = 0, x = 8$ about $x - axis$

(b) [14 points] $y = -x^2 + 4x - 3, y = 0$ about $y = -1$

(c) [14 points] $y^2 = 4x, y = x$ about $y = 8$