236 TEST 2

You may use your notebook during the last half hour of this exam.
You may NOT use calculators, cell phones, loose papers, or peeking.

Math 236
March 1, 2011

Name: _____

By printing my name I pledge to uphold the honor code.

1. True or false?

T **F** L'Hôpital's Rule only applies to limits where $x \to 0$ or $x \to \infty$.

T **F** If $\lim_{x\to 2} \ln(f(x)) = -\infty$, then $\lim_{x\to 2} f(x) = -\infty$.

T **F** $\lim_{x\to\infty} \dfrac{\sqrt{x}}{125 \ln x} = \infty$.

T **F** $f(x) = 2x^{100}$ dominates $g(x) = 100(2^x)$ as $x \to \infty$.

T **F** $y(t) = \sqrt{t+9}$ is a solution to the differential equation $\frac{dy}{dt} = \frac{1}{2y}$.

T **F** In a slopefield for a differential equation of the form $\frac{dy}{dx} = g(x)$, the slope at $(2, b)$ will be the same as the slope at $(3, b)$.

T **F** If $y_1(x)$ and $y_2(x)$ are both solutions to the differential equation $\frac{dy}{dx} = dy$, then the sum $y_1(x) + y_2(x)$ is also a solution to the differential equation.

T **F** If $\frac{dP}{dt} = kP(1 - \frac{P}{500})$, then for small values of t the population $P(t)$ behaves similarly to an exponential model.

T **F** If $f(x)$ is a positive-valued function and $\int_3^\infty f(x)\ dx$ diverges, then $\int_3^\infty (2f(x) + 1)\ dx$ also diverges.

T **F** If $f(x)$ is a positive-valued function and $\int_0^1 f(x)\ dx$ converges, and if $g(x) \geq f(x)$ for all x, then $\int_0^1 g(x)\ dx$ diverges.

2. Setting up integrals: Express each of the following in terms of proper definite integrals. Put boxes around your final answers.

PLEASE DO NOT SOLVE THE INTEGRALS.

a) the area between the graph of $f(x) = \frac{1}{x-x^2}$ and the x-axis on $[0, \infty)$ * *proper*

b) the circumference of a circle of radius 5

c) the volume of a sphere of radius 5, with the disc method

d) the volume of a sphere of radius 5, with the shell method

e) the work required to pump all the water out of the top of a upright conical tank that is 10 feet high and has a radius of 8 feet at the top

3. Calculations: Show all work and put a box around your final answer.

a) find $\displaystyle\int \frac{1}{x^4\sqrt{4-x^2}}\,dx$

b) solve $\dfrac{dy}{dx} = 0.5y(2-y)$

Bonus Survey: How did you do? What could have been on this exam, but wasn't?

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sCRAP (I will not be grading anything on the scrap page)