235 TEST 3

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

Math 235
December 2, 2010

Name: _____

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

1. For each problem CIRCLE all that apply, and CROSS OUT all that do not apply. If you do nothing on an item I will assume that you meant to cross it out. Problems could possibly have one, many, or no answers to circle.

a) Which of the following are true statements?

$\sum_{k=0}^{n} k = \frac{n(n+1)}{2}$ $\qquad$ $\sum_{k=0}^{1000} k^2 = \sum_{k=1}^{1000} k^2$ $\qquad$ $\sum_{k=1}^{n} a_k b_k = \sum_{k=1}^{n} a_k \sum_{k=1}^{n} b_k$

b) Which of the following is a 20-rectangle Right Sum approximation for $\int_2^6 f(x)\,dx$?

$\sum_{k=1}^{20} f(2+\frac{k}{100})(0.01)$ $\qquad$ $\sum_{k=1}^{20} f(2+\frac{k}{10})(0.01)$ $\qquad$ $\sum_{k=1}^{20} f(2+\frac{k}{100})(0.1)$ $\qquad$ $\sum_{k=1}^{20} f(2+\frac{k}{10})(0.1)$

c) Which of the following can we integrate using the techniques covered so far in class?

$\int \frac{1}{1+x}\,dx$ $\qquad$ $\int \frac{1}{1+x^2}\,dx$ $\qquad$ $\int \frac{x}{1+x}\,dx$ $\qquad$ $\int \frac{x}{1+x^2}\,dx$ $\qquad$ $\int \frac{x^2}{1+x}\,dx$

d) Which of the following are equivalent to the Fundamental Theorem of Calculus?

$\left[\int G'(x)\,dx\right]_a^b = \int_a^b G(x)\,dx$ $\qquad$ $\int_a^b f''(x)\,dx = [f'(x)]_a^b$ $\qquad$ $\int_a^b h(x)\,dx = [h'(x)]_a^b$

2. Set up an n-rectangle Right Sum approximation and take the limit as $n \to \infty$ to prove that $\int_2^4 (3x+1)\,dx = 20$.

3. In each problem write the quantity described in terms of one or more definite integrals. Please do NOT try to solve the definite integrals; just write them down.

a) The area between the graphs of $\sin x$ and $\cos x$ on the interval $[0, \pi]$.

b) The unsigned area of the region between the graph of $f(x) = 4x^2 + 4x - 3$ and the x-axis on the interval $[-2, 2]$.

c) The change in temperature, after 10 minutes, of a hot potato that is cooling at a rate of $T'(t) = -15e^{-0.5t}$ degrees per minute.

4. Calculate each of the following definite and indefinite integrals. For these problems you *may* use the Fundamental Theorem of Calculus when needed.

a) $\int \left(3 - \frac{4}{x^2} \right) dx$

b) $\int \frac{x}{3x^2 + 1} \, dx$

c) $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} 3 \sec^2 x \, dx$

d) $\int_0^1 \frac{3}{e^{2x}} \, dx$

Survey for 2 bonus points: What is a question or topic that could have been on this exam, but wasn't?
