NAME:

MATH 157 EXAM 4 DECEMBER 10, 2014

INSTRUCTIONS: Answer all 12 problems. Show all your work: even correct answers may receive little or no credit if a method of solution is not shown. There is no need to simplify your answers unless specifically asked to do so. Calculators, notes, cell phones, or other materials are not permitted.

1. Approximate $\displaystyle\int_{-2}^{0} \frac{1}{1+x^2}\,dx$ using 4 approximating rectangles and right endpoints. Your answer should be a sum of numbers; there is no need to compute the sum.

2. According to the midpoint rule, which of the following expressions should be the best approximation for $\int_0^{\pi} \cos^2 x\,dx$?

a) $\displaystyle\sum_{i=1}^{6} \frac{\pi}{6}\cos^2\left[\frac{(i-1)\pi}{6}\right]$

b) $\displaystyle\sum_{i=1}^{6} \frac{\pi}{6}\cos^2\left[\frac{i\pi}{6}\right]$

c) $\displaystyle\sum_{i=1}^{6} \frac{\pi}{6}\cos^2\left[\frac{(2i-1)\pi}{12}\right]$

3. Evaluate the integral $\displaystyle\int_{-2}^{2} \frac{|x|}{x}\,dx$.

4. Evaluate the indefinite integral $\displaystyle\int \frac{\sin(\ln x)}{x}\,dx$.

5. Evaluate the integral $\displaystyle\int_{0}^{\ln 4} e^{-x}\,dx$. Simplify your answer.

6. A particle has velocity at time t given by $v(t) = \cos(t)$.

a) Find the displacement of the particle from time $t = 0$ to time $t = \frac{3\pi}{4}$.

b) Find the total distance traveled by the particle from time $t = 0$ to time $t = \frac{3\pi}{4}$.

7. A function f is given by the formula $f(x) = \int_x^{2x} \ln t\,dt$. Calculate $f'(x)$.

8. A function f is given by the formula $f(x) = \displaystyle\int_{0}^{\ln 13} e^{t^2}\,dt$. Calculate $f'(x)$.

9. A particle moves with velocity $v(t) = 6 - 3t^2\,\frac{\text{m}}{\text{s}}$. Determine the average velocity of the particle over the interval $[0, 2]$.

10. Find y' when $y = \left(\dfrac{2x+1}{\sqrt{3x+2}}\right)^5$.

11. Calculate $(f^{-1})'(1)$ if $f(x) = \frac{2x}{x+1}$.

12. Find y' if $y = \frac{1}{\ln 5x}$.