HOMEWORK 8 - MATH 112 DUE DATE: Monday, November 26 INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the eight problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. Sketch the region whose area is represented by the definite integral and, then, use a geometric formula to evaluate it:
 - (a) $\int_0^5 (x+1)dx$
 - (b) $\int_{-3}^{3} \sqrt{9 x^2} dx$
- 2. Find the area of the shaded region (look at page 353)
 - (a) $y = 3e^{-x/2}$ (b) $y = \frac{x^2+4}{x}$
- 3. Evaluate the definite integrals:

(a)
$$\int_{1}^{4} \frac{2x-1}{\sqrt{x}} dx$$

(b) $\int_{0}^{2} \frac{x}{\sqrt{1+2x^{2}}} dx$
(c) $\int_{0}^{1} e^{2x} \sqrt{e^{2x}+1} dx$
(d) $\int_{0}^{2} \frac{x}{1+4x^{2}} dx$

- 4. Find the area of the shaded region (look at page 362)
 - (a) $f(x) = x^2 + 2x + 1$, g(x) = 2x + 5(b) $f(x) = x^2 - 4x + 3$, $g(x) = -x^2 + 2x + 3$
 - (c) $f(x) = -x + 3, g(x) = \frac{2}{x}$
- 5. Sketch the region bounded by the graphs of the functions and find the area of the region:
 - (a) $f(x) = \sqrt[3]{x}, g(x) = x$ (b) $f(x) = 4 - x^2, g(x) = x^2$
 - (c) $y = \frac{1}{x}, y = x^3, x = \frac{1}{2}, x = 1$
- 6. Use the midpoint rule with n = 4 to approximate the area of the region bounded by the graph of $f(x) = 2x x^3$ and the x-axis over the interval [0, 1]. Compare your result with the exact area.
- 7. Find the volume of the solid formed by revolving the region bounded by the graph(s) of the equation(s) about the x-axis.
 - (a) $y = x^2 + 1, y = 5$ (b) $y = \frac{1}{x}, y = 0, x = 1, x = 3$ (c) $y = x^2, y = 4x - x^2$
- 8. Use the disk method to verify that the volume of a right circular cone is $\frac{1}{3}\pi r^2 h$, where r is the radius of the base and h is the height.