Math 15, Exam 4, Dec 3, 2009

Instructions

Calculators may be used on this exam.

<u>However, you must show your work in order to receive credit.</u>

1. Be sure to print your name and your instructor's name in the space provided.
2. Work all problems. Show all work. Full credit will be given only if work is shown which fully justifies your answer.
3. There will be sufficient space under each problem in which to show your work.
4. Circle, box, or underline each final answer. *All final answers must be simplified!*
5. There are 100 points. Do not remove the staple!
6. Turn off your cell phone if you have one with you.

Get ready for the exam

1. Some formulas will be supplied (see below). You are asked to remember other formulas and techniques from Chapters 7-12 and Math 14.
2. You should be able to do all of the following:
   a. Find the length of an arc.
   b. Find the area of a surface of revolution (around one of the coordinate axes).
   c. Calculate force due to liquid pressure and find the centroid of a planar figure.
   d. Know how to approximate an integral with respect to Midpoint, Trapezoidal, and Simpson's rules.
   e. Know hyperbolic functions, derivatives, and integrals.
   f. Sketch curves given in parametric form and find tangent lines to such curves.
   g. Find arc length and surface area of revolution using equations in parametric form.
   h. Sketch graphs from equations given in polar form.
   i. Convert from polar coordinates to Cartesian coordinates and vice versa.
   j. Calculate first and second derivatives of parametric functions.
   k. Calculate areas and arclengths of polar functions.
   l. Know how to calculate Taylor's polynomials.

FORMULAS FOR MATH 15 EXAM 4

$$M_n = \Delta x[f(\bar{x}_1) + f(\bar{x}_2) + \cdots + f(\bar{x}_n)]$$

$$T_n = \frac{\Delta x}{2}[f(x_0) + 2f(x_1) + 2f(x_2) + \cdots + 2f(x_{n-1}) + f(x_n)]$$

$$S_n = \frac{\Delta x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \cdots + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]$$

$$ds = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx, \qquad ds = \sqrt{1 + \left(\frac{dx}{dy}\right)^2}\, dy, \qquad ds = \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt$$

$$L = \int ds, \qquad L = \int_a^b \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta$$

$$S = \int 2\pi y ds, \qquad S = \int 2\pi x ds, \qquad A = \int_a^b \frac{1}{2}\{[f(\theta)]^2 - [g(\theta)]^2\} d\theta$$

$$M_y = \rho \int_a^b x[f(x) - g(x)]dx, \qquad M_x = \rho \int_a^b \frac{1}{2}\left[(f(x))^2 - (g(x))^2\right] dx,$$

$$\bar{x} = \frac{M_y}{m}, \qquad \bar{y} = \frac{M_x}{m}, \qquad m = \rho A$$