

Exam #1
Math 274
September 22, 2003

Name _____

All questions are worth an equal number of points. All work is to be done on the blank paper provided. At the end of the exam, please hand in this sheet, together with all of your work.

§1 Calculation

1. Evaluate $\int_0^1 x^2 \sqrt{1 + 2x^3} dx$

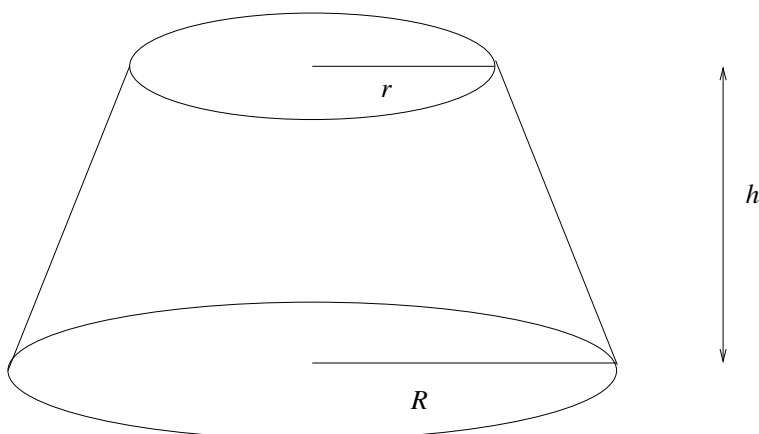
2. Evaluate $\int \sin(2x + 1) dx$

§2 Comprehension

3. What is the definition of the function $\ln x$? What is the derivative of $\ln x$? Use the definition to prove the result. Justify each step.

§3 Application

4. Find the finite area above the x -axis and below the curve $y = x^3 - 7x^2 + 10x$.
5. Find the area between the curves $x = 2(y - 1)^2$ and $x = 1 + (y - 1)^2$.
6. Find the volume of the solid generated by revolving the portion of the hyperbola $xy = 9$ between $x = 1$ and $x = 4$ about the x -axis.
7. Find the volume of the solid generated by revolving about the x -axis the region between the curves $y = x^2$ and $y = 4 - x^2$.
8. A force of 30 N is required to maintain a spring stretched from its natural length of 12 cm to a length of 15 cm. How much work is done in stretching the spring from 12 cm to 20 cm?
9. Find the volume of the frustum of a right circular cone with height h , lower base radius R , and upper base radius r .



10. The hemispherical tank illustrated below is full of water (62.5 lbs/ft^3). How much work is needed to pump all of the water out of the top of the tank?

