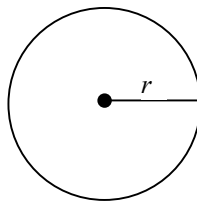
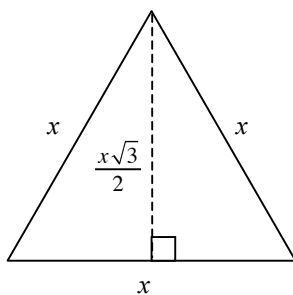
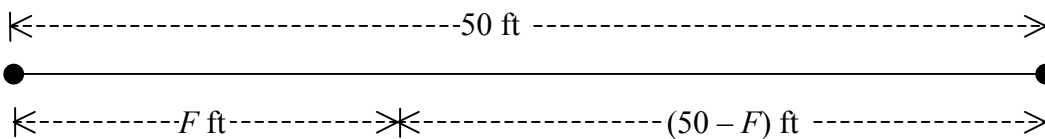


Name: \_\_\_\_\_

**MA2 Exam 2 Review Sheet**

Do and show all work on this paper. All problems must be answered using calculus techniques. Put a box around your final answers. *Scientific calculators* are permitted, but *graphing calculators* are not permitted on this exam.

- Given that  $r$  and  $h$  are functions of  $t$  and  $2r^5 - 20h^3 = 37$ , find  $\frac{dr}{dt}$ . [10 pts.]
  - Given that  $V$  and  $r$  are functions of  $t$  and  $3V - \frac{4}{3}\pi r^3 = 88$ , find  $\left. \frac{dV}{dt} \right|_{r=2}$ . [10 pts.]
- Find two positive numbers such that one number is the reciprocal of the other and the sum is a minimum.
- A farmer with 750 ft of fencing wants to enclose a rectangular area and then divide it into four pens with fencing running parallel to one side of the rectangle. What is the largest possible total area of the four pens?
- A Norman window has the shape of a rectangle surmounted by a semicircle. (Thus the diameter of the semicircle is equal to the width of the rectangle.) If the perimeter of the window is 30 feet, find the dimensions of the window that maximize the area of the semicircle.
- Fifty feet of wire, as shown below, is to be cut into two pieces. One piece will be bent into the shape of an equilateral triangle and the other piece will form a circle. Find the value of  $F$  in the figure below so that the combined area of the triangle and the circle is a maximum. Leave your answer in terms of  $\pi$ .



- A cylindrical tin can is to be made to hold 1 liter ( $1000 \text{ cm}^3$ ) of oil. The can is made by joining the ends of a rectangular piece of material to form the cylindrical side, and then attaching circular pieces to form the top and bottom. There are seams around the perimeter of the top and bottom and there is one seam down the side surface. The tin sheet to make the can costs \$1.00 per square meter. The cost of a seam is \$0.20 per meter. Find the dimensions of the can which will minimize its cost. What will each can cost?
- A cylindrical can having a volume of 18 cubic inches is to be covered by a label on the side but not on the circular ends. What should the dimensions of the can be in order to minimize the surface area of the label?