

Warm-Up Problems and Lecture Problems  
March 10, 2003

1. Solve the following equation for  $P$ :

$$\frac{M - P}{P} = Ae^{-kt} \tag{1}$$

2. Suppose you know that in equation (1) that  $M$  and  $k$  are constants given by  $M = 100$  and  $k = 2$ . Suppose you also know that  $P = 20$  when  $t = 0$ . Find  $A$ . Using the previous problem, write  $P$  as a function of  $t$ .
3. (Review problem) Suppose you use Simpson's Rule for the following integral:  $\int_1^5 e^{3x} dx$ .
- (a) What is the error formula for Simpson's rule (and what does everything mean)?
  - (b) Find a good value for  $K$  for our integral.
  - (c) If  $n = 100$ , then what is the worst the error can be?
  - (d) Find  $n$  so that the error is less than 0.01.

## Lecture Problems

4. Consider the curve  $y = x^2 + 1$ .
  - (a) Draw this curve and rotate it around the  $y$ -axis.
  - (b) Find the area function  $A(y)$  (the area of a  $y$ -cross section).
  - (c) Set up an integral representing the volume of the solid of revolution from  $y = 2$  to  $y = 4$ .  
(What does this part of the solid look like?)
5. Repeat the previous exercise, but rotate the curve around the  $x$ -axis and find the volume from  $x = -1$  to  $x = 3$ .