Warm-Up Problems and Lecture Problems
March 24, 2003

1. Suppose you have a continuous random variable X that has a probability density function given as:

$$f(t) = \begin{cases} \frac{1}{10} & 4 \leq t \leq 14 \\ 0 & \text{otherwise} \end{cases}$$

   (a) What are the two conditions a function has to satisfy in order to be a probability density function? Show that $f(t)$ satisfies these.

   (b) What is the probability that $10 \leq X \leq 15$?

2. Suppose you are a used car deal and you have sold 10 cars. For these cars, they all came back in a certain number of weeks with problems. Here is how many weeks it took each car to come back:

Car Number:	1	2	3	4	5	6	7	8	9	10
Weeks:	50	102	243	12	323	72	2	45	21	13

   Find the average number of weeks before the car came back.

Lecture Problems

3. Find the cumulative distribution function for problem 1. We will do this in steps. We will let $F(x)$ denote the CDF.

   (a) What is the definition of the CDF?

   (b) If $x < 4$, what is $F(x)$?

   (c) If $4 \leq x \leq 14$, then what is $F(x)$?

   (d) If $x > 14$ then what is $F(x)$?

   (e) What is the CDF, $F(x)$?

4. Suppose you want to model your used car failure with an exponential probability density function:

$$f(t) = \begin{cases} 0 & t < 0 \\ ce^{-ct} & t \geq 0 \end{cases}$$

   (a) What should c be using the data from problem 2?

   (b) Using this exponential model, what is the probability that a car will fail within the first year of purchase?