Math 026L.01 Spring 2000

Test #4

Name: _____

Read all of the following information before starting the test:

- Be sure that this test has **7** pages including this cover.
- There are **4** problems on this test worth a total of **50** points.
- The last page is for your scrap work and may be detached from the test booklet.
- Calculators are permitted, but no other aids are allowed. When you do use your calculator, sketch all relevant graphs and write down all relevant mathematics.
- Show all work neatly and in order, and clearly indicate your final answers.
- Answers must be justified whenever possible in order to earn full credit. ***No credit will be given for unsupported answers, even if your final answer is correct.***
- Please keep your written answers succinct. Points will be deducted for incoherent, incorrect and/or irrelevant statements.
- Good luck!

Problem	1	2	3	4	Total
Score					

1. (*8 points*) A light bulb company is interested in the lifespan of their light bulbs. Suppose that x measures the time (in months) it takes for a light bulb to fail. The company's research indicates that the density function for the lifespan of their light bulbs is well-modelled by

$$f(x) = \frac{1}{(1+x)^2} \quad \text{for} \quad 0 \leq x < \infty.$$

a. (*4 pts*) What fraction of light bulbs last more than 12 months?

b. (*4 pts*) What is the median lifespan for these light bulbs?

2. (*24 points*) Consider the function $f(x) = ce^{-px}$ defined for $0 \leq x < \infty$ where p is a fixed (but unknown) positive number.

(Note that all of your answers will depend on p.)

a. (*6 pts*) Find the value of c so that $f(x)$ is a density function.

b. (*6 pts*) What is the median of $f(x)$?

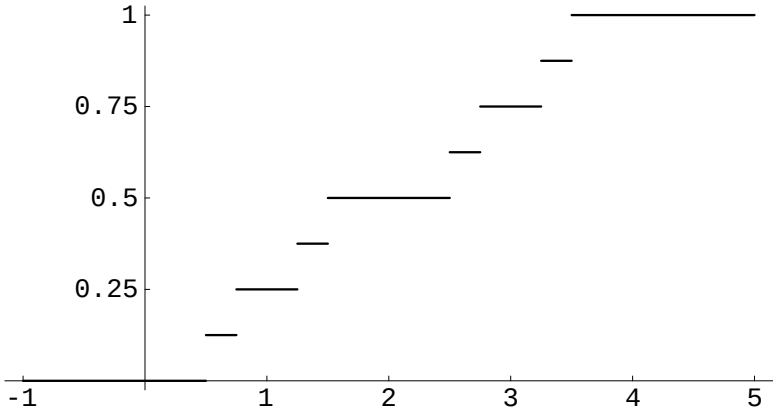
(Continued)

c. (*6 pts*) What is the mean of $f(x)$?

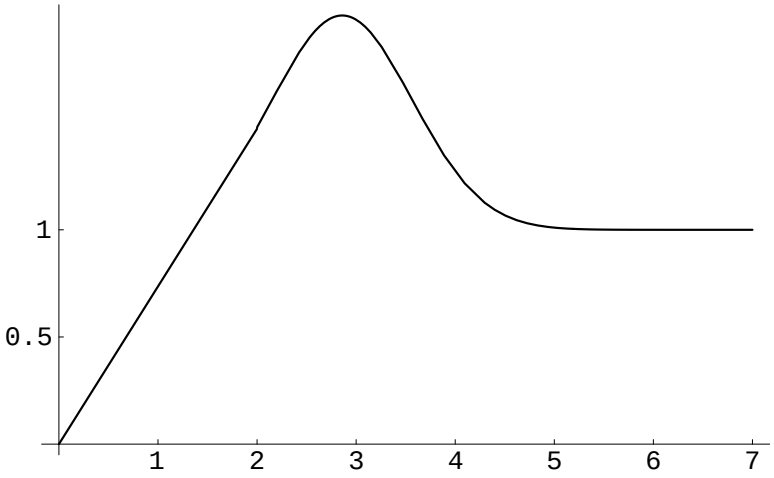
d. (*6 pts*) Compute the distribution function $F(x)$ for f.

3. (*8 points*) For each of the graphs shown below, decide whether it could represent a distribution function or not. Be sure to justify your answers.

a. (*4 pts*)



b. (*4 pts*)



4. (*10 points*) Suppose that the scores on a certain calculus test were distributed according to the **distribution** function

$$F(x) = \frac{2}{\pi} \arcsin(\sqrt{x})$$

where $0 < x < 1$ represents the score as a decimal.

a. (*4 pts*) What is the density function $f(x)$ associated with $F(x)$?

b. (*6 pts*) What fraction of students received a score less than 0.60?

(Hint: This problem cannot be solved with your answer from ***a.*** *Think about what information the distribution function gives.)*

Scrap Page

(*You may carefully remove this page from the test booklet.*)