

Homework 6

Do the problems on **Webwork** and turn the following problems in class on Mar. 9th.

Homework should be written neatly and clearly explained. If it requires more than one sheet, the sheets must be stapled. Include your name and id number in the top right corner of your homework.

Problem 1. Which of the following functions can be a probability density function for some continuous random variable. Explain your reasoning.

1)

$$f(t) = \begin{cases} e^t + 4t - e, & \text{for } 0 \leq t \leq 1 \\ 0, & \text{otherwise.} \end{cases}$$

2)

$$g(t) = \begin{cases} e^{-t}, & \text{for } t \geq 1 \\ 0, & \text{otherwise.} \end{cases}$$

3)

$$h(t) = \frac{1}{e-1} e^{\sin(t)} \cos(t), \text{ for } 0 \leq t \leq \pi/2.$$

4)

$$j(t) = \begin{cases} 0, & \text{for } t < 0 \\ \frac{1}{2}, & \text{for } 0 \leq t \leq 1/2 \\ 0, & \text{for } 1/2 < t < 1 \\ \frac{1}{2}, & \text{for } 1 \leq t \leq 3/2 \\ 0, & \text{for } 3/2 < t. \end{cases}$$

5)

$$k(t) = t^2 \text{ for all } t \in \mathbb{R}$$

Problem 2. Let $p > 0$ be a real number. Consider function f which has values

$$f(t) = \begin{cases} Ct^{-p}, & \text{for } t \geq 2 \\ 0, & \text{otherwise.} \end{cases}$$

- For which values of p is there a constant C so that this function f is a probability density function for some continuous random variable?
- For which values of p will this random variable have finite expectation?
- For which values of p will this random variable have finite variance?