

# Homework 11

Math 262

Write your solutions to the following problems and turn them in to the homework mailbox (RMS level 3, near the fireplace) by 5:00pm on **Friday, April 21**.

## Book Problems

- Section 3.4 #75ab, 76ac, 77 (pages 233–235)
- Section 3.7 #113, 115, 117, 122, 123, 125 (pages 264–265)

## Additional Problems

1. A roll of copper wire has flaws that occur according to a Poisson process with a rate of 1.5 flaws per meter. The *distance between successive flaws* is then exponentially distributed with parameter  $\lambda = 1.5$ . Find the following:
  - (a) The mean and variance of the distance between successive flaws on the wire
  - (b) The probability that the distance between a randomly selected flaw and the next flaw is at least a meter
  - (c) The probability that the distance between a randomly selected flaw and the next flaw is between 0.5 and 1.5 meters
2. If  $X_1$  and  $X_2$  are independent exponential random variables with parameter  $\lambda$ , then the sum  $Y = X_1 + X_2$  has a gamma distribution with  $\alpha = 2$  and  $\beta = \frac{1}{\lambda}$ .  
For example, suppose  $X_1$  is the amount of time required for one person to complete a certain task, and  $X_2$  is the amount of time required for a different person to complete the same task. Further suppose  $X_1$  and  $X_2$  are independent exponential random variables with mean 10 minutes. Find the expected value and variance of the following:
  - (a) Total time that both people will spend on the task.
  - (b) The average time that each person will spend on the task.