

## Homework 8

Math 262

Write your solutions to the following problems and turn them in to the homework mailbox (RMS level 3, near the fireplace) by 4:00pm on **Friday, March 23**.

### Book Problems

Section 2.7 #107, 109, 113, 114, 117, 120 (pages 158–160)

### Additional Problems

- For a certain section of forest, the number  $X$  of diseased trees per acre has a Poisson distribution with mean  $\mu = 10$ . To treat the trees, spraying equipment is rented for \$150. The diseased trees are sprayed with insecticide at a cost of \$5 per tree. Let  $C$  be total cost of spraying a randomly selected acre of forest.
  - Find the moment generating function of  $C$ .
  - Find the expected value and standard deviation for  $C$ .
  - Use Chebyshev's inequality to find an interval that contains  $C$  with probability of at least 0.8.
  - Using your knowledge about the Poisson distribution, can you find a smaller interval than what you found in part (c) that still contains  $C$  with a probability of at least 0.8?
- Find the distributions of the random variables that have each of the following moment-generating functions. (*Hint*: refer to Section 2.7.3 in the textbook.)
  - $M_X(t) = \left[\frac{1}{3}e^t + \frac{2}{3}\right]^5$
  - $M_Y(t) = \frac{2e^t}{3-e^t}$
  - $M_Z(t) = e^{3(e^t-1)}$