

STAT 421 / M 421      HOMEWORK #7      Due: Wednesday October 26, 2009

You must justify your answers to receive credit. **Total: 22 points.**

1. (4pt) Let  $X$  be a discrete with pdf  $f(x) = \frac{3^x e^{-3}}{x!}$  for  $x = 0, 1, 2, \dots$  and is 0 otherwise.
  - (a) Show the moment generating function (mgf) for  $X$  is  $M_x(t) = e^{3(e^t-1)}$ .
  - (b) Use this mgf to find  $E(X)$  and  $\text{Var}(X)$ .
  
2. (3pt) A golfer is practicing her putting. Assume she is 10 feet from the hole. Let  $X$  be the number of times she sinks a 10 foot putt in her next 8 attempts.
  - (a) What must we assume for  $X$  to be a binomial random variable?
  - (b) Suppose that these assumptions are met, and that the probability that she sinks any putt is .8. Find the pdf of  $X$ . (Round the probabilities to 5 decimal-place accuracy).
  - (c) What are the mean and variance of  $X$ ?
  
3. (2pt) A golfer is practicing her putting. Assume she is 10 feet from the hole. Let  $X$  be the number of putts before she sinks her first 10 foot putt. Assume that the probability that she sinks any putt is .8.
  - (a) Find the  $P(X = 3)$ . (Round this probability to 4 decimal-place accuracy).
  - (b) Find the  $P(X > 2)$ . (Round this probability to 4 decimal-place accuracy).
  - (c) What are the mean and variance of  $X$ ?
  
4. (3pt) Exercise 4, page 128. For (a) and (b), your answers should be simplified polynomials. Clarification for part (c): Specify the values of  $q$  for which the 4 engine plane is safer and the values of  $q$  for which the 2 engine plane is safer.
  
5. (2pt) Exercise 5, page 128.
  
6. (1.5pt) Exercise 9, page 128-9. State your answers as simplified fractions (and not as decimal approximations).
  
7. (1.5pt) Exercise 11, page 129.
  
8. (2pt) Exercise 17, page 129.
  
9. (2pt) Exercise 18 (a) only, page 130.
  
10. (1pt) Exercise 20, page 130.

Extra Credit: (2pt) Show For  $0 < a < 1$ ,  $\sum_{x=0}^{\infty} xa^x = \frac{a}{(1-a)^2}$