Math 403 Fall 2009

Homework 7

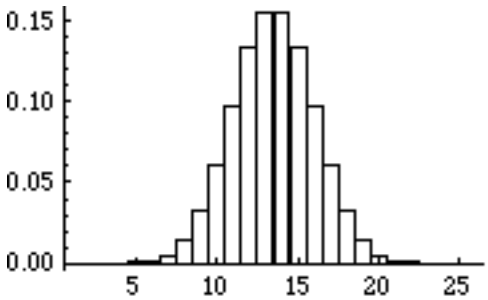
Due Wednesday, October 14

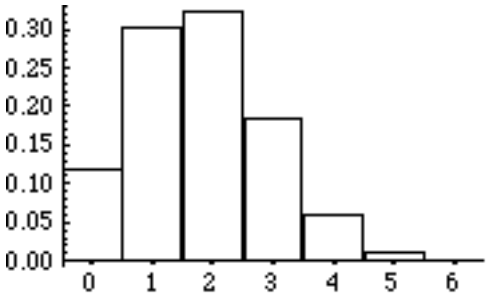
WMMY: Ch 6 # 1, 3, 5, 7, 9, 13, 17
Ch 5 # 7, 16, 25, 27
Ch 6 # 24, 27, 30, 33, 37

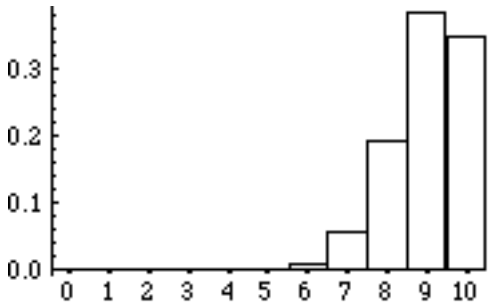
Problem A: Binomial or not? Which of these variables X follow a binomial distribution? Give brief explanations.

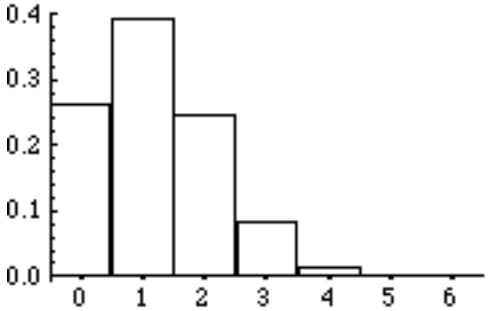
i. When an automated dialer for an opinion poll calls phone numbers at random, only 20% of the calls reach a live person. After 100 calls, X is the number that reached a live person.
ii. The same automated dialer makes calls until 20 live persons are reached. X is the number of calls it needed to make.
iii. The new computerized SAT asks multiple choice questions, adapting the test to skip easier questions when the student does well. X is the number of questions the student gets right.
iv. An NFL kicker has made 80% of his field goal attempts in the past. This season he attempts 20 field goals, and X is the number he makes. Note that field goals differ in distance, angle, wind, and so on.
v. Joe buys a ticket in the Missouri Pick 3 lottery game every week for a year. X is the number of times he wins a prize.
vi. A cosmic ray detector runs for an hour. X is the number of cosmic rays it detects.

Problem B. The graphs below show binomial distributions $b(x;n,p)$, shown on the interval $[0,n]$. In each graph, give your best estimate of p.









Problem C: Let X have the binomial distribution $b(x;n,p)$. Graph σ_X as a function of p. What value of p maximizes the standard deviation of X?

Problem D: Suppose you flip a coin 1000 times and count X, the number of heads. What is the expected number of heads? Give a range centered on the mean that will contain X with 99% probability.

Problem "E is for egregious errors": Consider problems 6.25, 6.35, 6.36, and 6.38 from WMMY, which expect you to use the normal approximation to the binomial distribution to compute probabilities. Explain why these problems are bad, and why the authors of this book should be taken to the woodshed and whipped.