Stat 322 - Homework 6

Maximum score is 20 points.

1 1100 club for Pumpkin growers

Todd Holland from NY grows pumpkins. He studied his past records carefully and concluded that his biggest pumpkins are distributed according to a normal distribution with mean 950 lbs and standard deviation 50 lbs.

(a) What is the probability for Todd to get his biggest pumpkin weighing more than 1000 lbs?

(b) What is the probability for Todd to get his biggest pumpkin weighing less than 840 lbs?

(c) What is the probability Todd to get his biggest pumpkin weighing between 900 and 1000lbs?

(d) Todd wants to get into this prestigious "1100 Club" (it really exists!) which has members who have grown pumpkins weighing more than 1100 lbs. What is the probability that he will get into the club this year?

(e) Todd wants to build a fancy table to show off his biggest pumpkin this year. How much weight should the table be able to support so that there is 99% chance that the table will not break when he puts his biggest pumpkin on the table?

(1+1+2+1+3 points)

2 Normal Approximation of Binomial

(a) Find the probability of getting at most 45 heads in 100 tosses of a fair coin (i.e $P(H) = 0.5$) Justify if you are using any approximation.

(b) A certain college would like to have 1050 freshmen. This college cannot accommodate more than 1060. Assume that each applicant accepts with probability .6 and that the acceptances can be modeled by a Binomial distribution. If the college takes 1700 students, what is the probability that the college will have too many acceptances (that is, more than 1060)?

(3+3 points)

3 Central Limit Theorem

A bank accepts rolls of pennies and gives 50 cents credit to a customer without counting the contents. Assume that a roll contains 49 pennies 30 percent of the time, 50 pennies 60 percent of the time, and 51 pennies 10 percent of the time.

(a) Find the expected value and the variance for the amount that the bank **loses** on a typical roll.

(b) Let Y = total amount the bank loses in 100 rolls. What is the distribution of Y?

(c) Estimate the probability that the bank will lose more than 25 cents in 100 rolls.

(2+2+2 points)