Homework 21: The Central Limit Theorem

1. Wisconsin Tech's basketball team, the Three Point One Four Shooters, have a 70% free-throw percentage.
   (a) Write a formula for the exact probability that out of their next one hundred free throws, they will make between seventy-five and eighty, inclusive.
   (b) Approximate the probability of part (a).

2. Fifty-five percent of the registered voters in Mount Pleasant favor their incumbent mayor in her bid for re-election. If four hundred voters go to the polls, estimate the probability that
   (a) the race ends in a tie.
   (b) the challenger scores an upset victory.

3. A bank teller serves customers standing in line one by one. Suppose that the service time for a customer has mean 2 (minutes) and variance 0.6, and assume that service times for different bank customers are independent.
   (a) Find the probability that the time required to serve 50 customers is between 92 and 108 minutes.
   (b) The bank wants to find a time interval $(100 - x, 100 + x)$ for which there is a 0.85 probability that the teller can serve 50 customers. Find x.