Section 5.7 Normal Approximation to the Binomial Distribution

Math 141

Main ideas

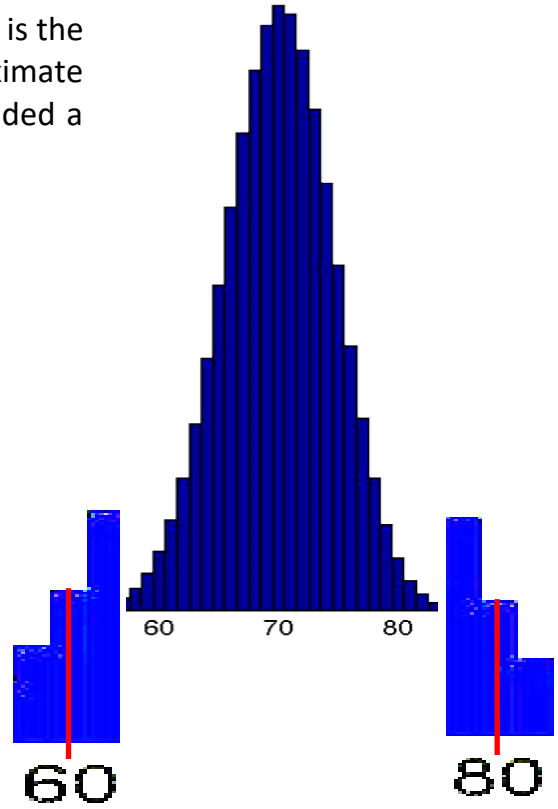
We can approximate the binomial distribution with the normal approximation. The larger n is, the better the approximation.

Recall for the binomial distribution that $\mu = np$ and $\sigma = \sqrt{np(1-p)}$. Also recall the notation that $\binom{n}{k} = C(n,k)$.

Problems

First, recall Problems 3 and 4 from the previous handout. Notice how as n is larger, the distribution looks more and more like a normal distribution. Also see Figures 5.7.1 –4. Finally, recall that when we have normal distribution we need the mean and standard deviation. This is one reason we were interested in μ and σ for binomial distribution problems (like shooting free throws).

1. For a 70% free throw shooter who takes 100 shots, what is the probability of making between 60 and 80 shots? Approximate this answer using a normal distribution. (I've also included a zoomed-in view around 60 and 80.)



2. The incidence rate of color blindness among men in a certain country is 20%. A sample of 70 men is taken. What is the probability that 14 or more of the men are color blind? Find this value exactly.

3. Use the normal curve to approximate the probability of the Problem 2.

4. For Problem 2, find the probability that exactly 14 of the 70 men are color blind. Find this value exactly.

5. Use the normal curve to approximate the probability of Problem 4.

6. An airline accepts 150 reservations for a flight on an airplane that holds 140 passengers. If the probability of a passenger for this flight cancelling is .14, estimate the probability that one or more passengers will be bumped. Let X be the number who do not show up for the flight.

X	# bumped
0	10
1	9
⋮	⋮
9	1
10	0