Week 5 Monday

## Review

Make sure you know your neighbors' names. Then discuss:

Suppose pnorm is a function that takes z-scores to percentiles, and qnorm is a function that takes percentiles to z-scores. How would you use these functions to find the number  $z^*$  with the property that half of observations in a normal distribution are contained within  $z^*$  standard deviations of the mean?

**Binomial Distribution** 

1. Suppose 90% of Americans have had chickenpox by the time they reach adulthood. In a simple random sample of 10 American adults, what is the probability that 9 or more have had chickenpox?

- (A)  $\binom{10}{9} 0.9^9 0.1^1$
- (B)  $\binom{10}{9} 0.9^1 0.1^9$
- (C)  $\binom{10}{9} 0.9^1 0.1^9 + \binom{10}{10} 0.9^0 0.1^{10}$
- (D) None of the above

2. Roughly one out of every 10,000 clovers has four leaves. How many clovers would you need to sample in order to be reasonably convinced that the binomial random variable that counts the number of four-leaf clovers in your sample can be well approximated by a normal distribution?

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- (A) 1,000
- (B) 10,000
- (C) 100,000
- (D) None of the above

3. About 13% of Americans speak Spanish at home. Suppose you take a simple random sample of 100 Americans. What is the probability that at most 10 people in your sample speak Spanish at home?

Do this problem twice: once "exactly" using a binominal distribution, and once "approximately" using a normal distribution. Make sure to verify the necessary hypothesis for using a normal approximation! How close are your two answers?

4. You have prior information suggesting that 90% of Americans have had chickenpox by the time they reach adulthood. In a simple random sample of 1000 American adults, you find that 10 people have never had chickenpox. Is this an "unusually low" number?

- (A) Yes
- (B) No
- (C) I don't know!