

Stat 1040 Recitation packet 7

1. In a large population of voters, there are 75% Republicans. I plan to take a simple random sample from this population of voters. **In each case**, which is more likely, or are they about the same? (No explanations are necessary.)
 - (a)
 - i. Getting more than 80% Republicans in a sample of 100?
 - ii. Getting more than 80% Republicans in a sample of 1000?
 - (b)
 - i. Getting between 70% and 80% Republicans in a sample of 100?
 - ii. Getting between 70% and 80% Republicans in a sample of 1000?
 - (c)
 - i. Getting exactly 75 Republicans in a sample of 100?
 - ii. Getting exactly 750 Republicans in a sample of 1000?
2. Suppose that the percentage of people in a given state who voted for Obama is exactly 52%. We plan to take a random sample of people in this state.
 - (a) Which is more likely (no calculations are necessary):
 - i. Getting less than 50% of a sample of size 100 who voted for Obama.
 - ii. Getting less than 50% of a sample of size 400 who voted for Obama.
 - (b) Which is more likely (no calculations are necessary):
 - i. Getting exactly 52 people who voted for Obama out of a sample of 100.
 - ii. Getting exactly 520 people who voted for Obama out of a sample of 1000.

Note: we sample without replacement, but the sample size is small compared to the population so we can pretend we are sampling with replacement.
3. Gamers often use a D-10 die, which has 10 sides labeled 0,1,...,9. Each side occurs with chance 1 in 10. **In each case**, which is more likely, or are they the same? (No explanations are necessary.)
 - (a)
 - i. Rolling more than 8% 9's in 1000 rolls.
 - ii. Rolling more than 8% 9's in 10000 rolls.
 - (b)
 - i. Rolling more than 110 9's in 1000 rolls.
 - ii. Rolling more than 1010 9's in 10000 rolls.
 - (c)
 - i. Rolling between 8% and 12% 9's in 1000 rolls.
 - ii. Rolling between 8% and 12% 9's in 10000 rolls.
 - (d)
 - i. Rolling exactly 100 9's in a sample of 1000 rolls.
 - ii. Rolling exactly 1000 9's in a sample of 10000 rolls.
4. Five hundred draws will be made at random with replacement from a box with 4 tickets. The tickets are numbered 2, 3, 5, 6.
 - (a) Find a box model for the total of the numbers drawn.
 - (b) Find a box model for the number of 3's in the draws.
5. Suppose someone plays a game in which they roll a die. If the die lands 1 or 6, they win \$1, otherwise, they lose \$1. They plan to play the game 400 times and we are interested in the net amount they will win.
 - (a) The amount they win is like the sum of 400 draws from the box: (Fill in the box and the number of draws. You do not need to calculate anything).

- (b) The number of times they win is like the sum of 400 draws from the box: (Fill in the box and the number of draws. You do not need to calculate anything).
6. A store has “scratch and win” cards that show a prize of \$0, \$1, \$2, or \$3. The chance of getting these prizes is 80%, 10%, 7% and 3% respectively.
- Make a box model for the total amount of prize money the store will pay for the next 500 customers, assuming the prizes really are random.
7. According to a genetic theory, there is a 15% chance that a randomly selected person from a large population has a given gene. If I take a simple random sample of 1000 people from this population, find a box model for the number of people in the sample that will have the gene.
8. A basketball player claims to have an 80% chance of making any free-throw. Assuming her claim is correct, and that her free-throws are independent, make a box model for how many free-throws she would make if she tried 30 times.