

Stat 1040 Recitation 7 Solutions

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? 75%
 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.

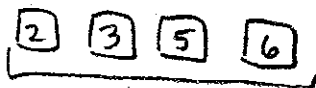
3. Gamers often use a D-10 die, which has 10 sides labeled 0,1,...,9. Each side occurs with chance 1 in 10. **In each case**, which is more likely, or are they the same? (No explanations are necessary.)

- (a) i. Rolling more than 8% 9's in 1000 rolls. 10%
 ii. Rolling more than 8% 9's in 10000 rolls. 8%
- (b) i. Rolling more than 110 9's in 1000 rolls.
 ii. Rolling more than 1010 9's in 10000 rolls. chance error bigger than 10
- (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.

The total is like the sum of 500 draws from

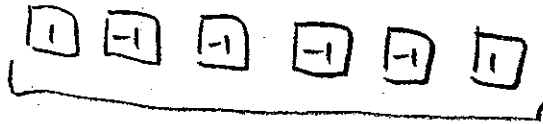


(b) Find a box model for the number of 3's in the draws.



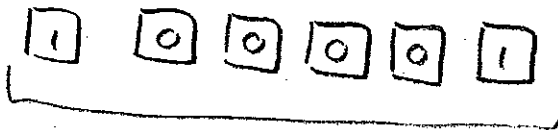
5. Suppose someone plays a game in which they roll a die. If the die lands 1 or 6, they win \$1, otherwise, they lose \$1. They plan to play the game 400 times and we are interested in the net amount they will win.

(a) The amount they win is like the sum of 400 draws from the box:



(Fill in the box).

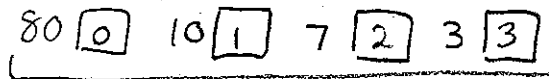
(b) The number of times they win is like the sum of 400 draws from the box: (Fill in the box).



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.

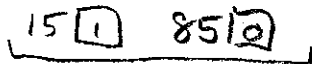
Make a box model for the total amount of prize money the store will pay for the next 500 customers, assuming the prizes really are random.

The prize money is like the sum of 500 draws from the box



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.

The number who will have the gene is like the sum of 1000 draws from the box



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.

The number she would make is like the sum of 30 draws from the box

