

Lecture_Probability and Frequentist Concepts

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10/21/2021

Q1 (2 pts.): What is the probability of observing a count of exactly 3 successes in a binomial distribution with parameters $n = 4$ and $p = 0.75$?

```
dbinom(3, 4, 0.75)
```

```
## [1] 0.421875
```

Q2 (2 pts.): What is the probability of observing a count of 3 successes or fewer in a binomial distribution with parameters $n = 4$ and $p = 0.75$?

```
pbinom(3, 4, 0.75)
```

```
## [1] 0.6835937
```

Q3 (2 pts.): What is the probability of observing more than 3 successes in a binomial distribution with parameters $n = 5$ and $p = 0.75$?

```
1 - pbinom(3, 5, 0.75)
```

```
## [1] 0.6328125
```

Q4 (2 pts.): - What is the probability of observing a value of less than 1.2 from a normally-distributed population with mean = 2 and standard deviation = 2?

```
pnorm(1.2, mean = 2, sd = 2)
```

```
## [1] 0.3445783
```

Q5 (2 pts.): - What is the probability of observing a value of greater than 1.2 from a normally-distributed population with mean = 2 and standard deviation = 2?

```
1 - pnorm(1.2, mean = 2, sd = 2)
```

```
## [1] 0.6554217
```

Q6 (4 pts.): - What is the probability of observing a value between 1.2 and 3.2 from a normally-distributed population with mean = 2 and standard deviation = 2?

```
pnorm(3.2, mean = 2, sd = 2) - pnorm(1.2, mean = 2, sd = 2)
```

```
## [1] 0.3811686
```

Q7 (2 pts.): Describe how the shape of the histogram changes as you continue to press the sample button.

The more times you sample, the closer the shape of the histogram looks like the skewed distribution.

Q8 (2 pts.): Describe how the shape of the histogram changes as you continue to press the sample button.

The more times you sample, the closer the shape of the histogram looks like the skewed distribution. The difference between the sample sizes results in less values falling on the outer edges of the distribution.

Q9 (2 pts.): Describe how the shape of the histogram changes as you continue to press the sample button.

The shape of the histogram looks closer to a normal distribution the bigger the sample size gets and more samples you do. More values falling closer to the center of the curve.

Q10 (2 pts.): Why is there such a drastic change in the shape of the sampling distribution when you change the sample size from 1 to 2?

You're essentially doubling the amount of data you're putting into your model. The more samples you collect the closer to the true mean you will get.

Q11 (2 pts.): What are the two main factors that determine the width of the sampling distribution of the mean?

The amount of samples that are taken and the standard deviation.

Q12 (2 pts.): How many 3-character words are possible?

15,625

Q13 (2 pts.): How many books would the Library contain if you added one additional position to the book size? Express your answer in terms of B.

$B = 25^{1,328,400}$ or according to my calculator, infinity.