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Probability and Frequentist Concepts

**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, .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, .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, .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, 2, 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 - pbinom(1.2, 2, 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(1.2, mean = 2, sd = 2)- pnorm(3.2, 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 shape of the histogram, which started at nothing, increases to the shape of the drawn histogram set by the parameters α and β. The percentage of the counts don’t change or vary by much either, the overall shape of the counts stays within the shape of the histogram. The sample stays with in the full distribution, not just the curve/bell, and it remains that way as I continue to press the sample button.

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

The shape of this histogram is the same as the previous in that it stays within the drawn parameters, but it does look different. The shape of the histogram only falls within the curve/bell and does not go out into the “tail”, no matter how many times I press the sample button

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

The shape of the histogram is completely different than previous times. This time the counts that accumulate when I press the sample button do not form the full histogram, only a few percentages appear within the bell of the histogram.

**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?**

There is such a drastic change in the shape of the sampling distribution when changed from 1 to 2 because according to the central limit theorem, the larger the sample size the better the approximation of the distribution.

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

The two main factors that determine the width of the sampling distribution of the mean are the standard deviation and the sample size.

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

There are 25x25x25= 253= 15,625 possible 3-character words

**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.**

If we add one additional position to book size, that will equal 81 positions per row rather than 80.

So, in terms of B:

B = 410x40x81= 1,328,400 positions for characters in each book

Since there are 25 characters in the Library’s character set, there are a total of B possible books:

B= 251,328,400