1. A test for breast cancer is 90% effective in detecting the cancer in women who do have breast cancer.
   a. Suppose that 30 women who have breast cancer go in for testing. What is the expected number test that would detect breast cancer?
   b. What is the probability having all the 30 test having a positive result (all the cancers are detected)?
   c. What is the probability of having 28 or more of the tests detect the cancer?

2. Too much cholesterol in the blood increases the risk of heart disease. Young women are generally less afflicted with high cholesterol than other groups. The cholesterol levels of women aged 20 to 34 follow an approximately normal distribution with mean 185 milligrams per deciliter (mg/dL) and standard deviation 39mg/dL.
   a. Cholesterol levels above 240 mg/dL demand medical attention. What is the probability of choosing a young woman aged 20 to 34 at random and having her cholesterol level above 240 mg/dL?
   b. If I chose 4 women at random, aged 20 to 34 years, what is the probability that the average cholesterol level of the 4 women is 240mg/dL or higher?
   c. If I chose 4 women at random, aged 20 to 34 years, what is the probability that 1 out of the 4 women has a cholesterol level of 240 mg/dL or higher?
   d. Suppose that I choose 4 women at random, aged 20 to 34 years. Their names are Lisa, Yee, Dawn, Anita. You have no other information about these women. What is the probability that Lisa is the only one with a cholesterol level above 240mg/dL.

3. Suppose I want to estimate the mean of the score on a standardized exam given to all high school seniors. The possible scores on the exam range from 0 to 300. It is suspected that the distribution of scores is slightly skewed. I choose a random sample of 100 students to take the exam. I get back the results and the scores and the average is 210, with a standard deviation of 22. I will assume that \( \sigma = 22 \).
   a. Create a 95% confidence interval for the mean score.
   b. What does the number 95% signify? Explain.
   c. I want to gather a new sample, but I want my margin of error to be smaller, 2/3 of the margin of error from part “a”. How big should I make my sample size?
4. If a population is normally distributed with mean \( \mu = 6 \) units and standard deviation \( \sigma = 1 \) unit, then

a. the distribution (shape, type) of the sampling distribution of the mean for \( n = 2 \), will be …

b. the mean of the sampling distribution of the mean is ________ and the standard deviation is ________

5. True or False. If the population distribution is not normally distributed, but we gather a very large sample size, the sampling distribution of the mean will exactly normally distributed.

6. A recent statistic released by the Oregon Unemployment Bureau said that the unemployment rate is at 8.3%. Assume that the 8.3% is the actual proportion of unemployed in Oregon.

a. If we conducted a poll (SRS) of 1000 people who fit the definition needed to be either be considered employed or unemployed, how many we would expect to be unemployed?

b. What is the probability that we would find that 70 or less people in our poll to be unemployed? Use a normal approximation. Round to the nearest hundredth of a percent.

c. What is the probability that we would find that 70 or less people in our poll to be unemployed? Use a normal approximation with continuity correction. Round to the nearest hundredth of a percent.

7. During Halloween all the kids in the block know that the man living at the brown house either gives a Trick or Treater four pieces of candy or just one piece of candy. It is observed by the children who have studied statistics, that there is a probability of 70% of just getting one piece of candy. It is also observed that the events a child receives one piece of candy and the event a child receives four pieces of candy are independent of each other. Let the random variable \( Y \) be the number of pieces of candy given to one child.

<table>
<thead>
<tr>
<th>( Y )</th>
<th>( 1 )</th>
<th>( 4 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P(y) )</td>
<td>0.7</td>
<td>0.3</td>
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a. Five children walk up to the man’s house, what is the probability that two or more of the children receive one piece of candy?

b. If many, many, many, many, children visit the house in one evening, what is the average number of candy pieces the man hands out to each child; that is, what average would we expect to observe?

c. Let us say that 400 children visit the house in one evening. What is the probability that the average number of pieces given to each child is 2 or greater?

8. I create a 93% confidence interval to estimate the population mean. I decide to create a 97% confidence interval instead with the same data. Will the interval created with the 97% confidence interval be narrower or wider compared to the 93% confidence interval?