To get credit you must show your work. If your answer involves using a formula, make sure you write down the formula! Also write down any expression you enter into the calculator. Mark clearly whether you are using a \( z \)-distribution, a \( t \)-distribution, or a chi-squared distribution.

1. In the standard normal distribution, find \( P(-0.23 < z < 1.65) \). Draw a picture and give the formula used to find the probability.

2. Find the value of \( z \) in the standard normal distribution such that the area to the right of \( z \) is 0.45. Draw a picture and give the formula used to find the probability.

3. The mean time it takes students to complete a statistics exam is 40 minutes with a standard deviation of 5 minutes. Assuming the times are normally distributed, find the probability that a student completes the exam in less than 32 minutes.

4. Packages of ground beef in a supermarket have weights that are normally distributed with a mean weight of 16 ounces and a standard deviation of 0.08 ounces. What is the probability that the packages will weigh between 15.97 ounces and 16.04 ounces?

5. The incredibly concerned-about-profit-margins shoe company produces shoes whose life is normally distributed with a mean life of 10 months and a standard deviation of 1.3 months. They wish to offer a guarantee. How many months should the guarantee be if they do not wish to replace more than 5% of the shoes sold?

6. The mean weight of airline passengers is 154 pounds with a standard deviation of 15 pounds. Find the probability that the mean weight of 225 passengers on an airplane will exceed 155.5 pounds.

7. A sample of 144 tomato plants in an agricultural experiment had an average yield of 5 pounds of tomatoes with a population standard deviation of 0.66 pounds. Find the 95% confidence interval for the mean yield of tomato plants.

8. A sample of 9 tomato plants in an agricultural experiment had an average yield of 5 pounds of tomatoes with a standard deviation of 0.66 pounds. Find the 90% confidence interval for the mean yield of tomato plants.

9. In a survey, 84 out of 140 people believed that statistics should be compulsory for people who want to understand and how the world works. Find the 99% confidence interval for the proportion of people who believe (quite correctly) that statistics should be compulsory for people who want to understand and how the world works.
10. The president of Dogdale College wishes to know the proportion of students who enjoy their math classes. An earlier survey showed that 78% of students enjoy their math classes. If the president wishes to know the percent of students who enjoy their math classes within 4 percentage points at the 90% confidence level, how many students should be surveyed?

11. It was found that the variance ($s^2$) in a sample of 17 measurements was 1.2. Find the 98 percent confidence interval for the population variance.

12. One of every three Americans believes that the U.S. government should take primary responsibility for eliminating poverty in the U.S. If one hundred Americans were selected at random, find the probability that at most thirty of them will believe that the U.S. government should take primary responsibility for eliminating poverty in the U.S.

SOLUTIONS:

You will be asked to list what formula and points you used like in number 1, 2, and 3. You will also be asked what $t$-value, $z$-value, or chi-squared value you used.

1. 0.5415
2. .13
3. 0.0548
4. 33.95%.
5. The guarantee should be 7 months (or less).
6. 0.0668.
7. $4.89 < \mu < 5.11$
8. $4.59 < \mu < 5.41$
9. $0.493 < p < 0.707$
10. The sample size should be 292.

11. $\frac{16(1.2)}{32} < \sigma^2 < \frac{16(1.2)}{5.812}$, $0.600 < \sigma^2 < 3.304$

12. The probability that at most thirty of them will believe that the U.S. government should take primary responsibility for eliminating poverty in the U.S. is 29.46%.