

Sampling Distributions

Chapter **7**

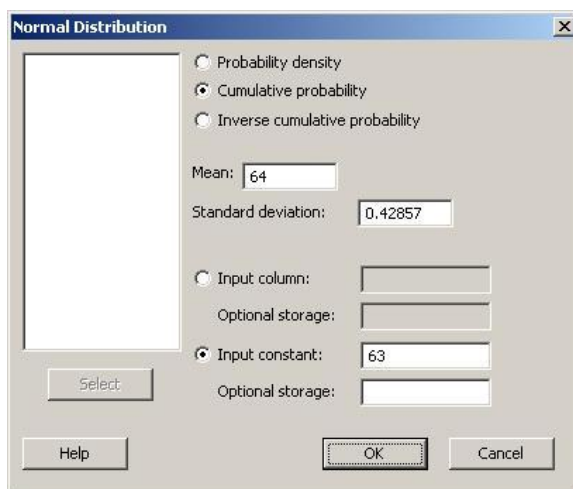
Finding Probabilities Concerning the Sample Mean

Assume that the height of women follows a normal distribution with a mean of 64 inches and a standard deviation of 3 inches. A random sample of 49 women is selected. What is the probability that the mean height of this sample will be less than 63 inches?

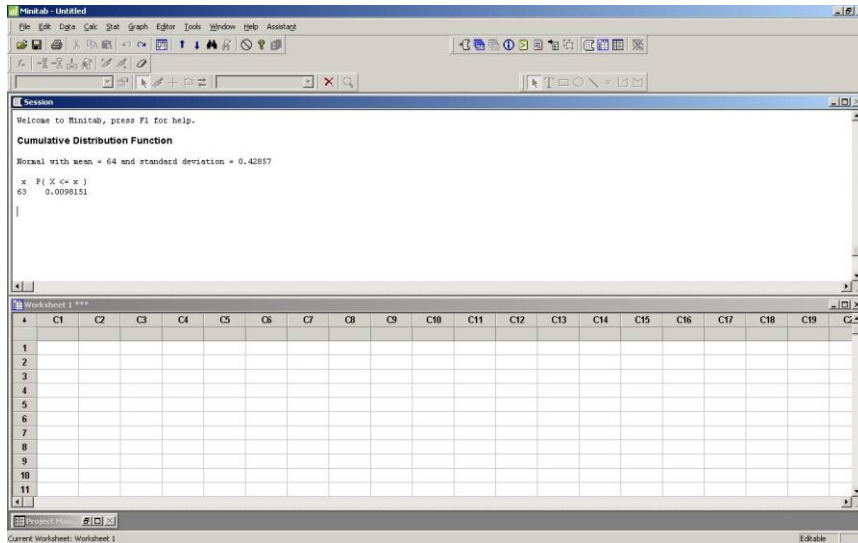
First, by hand, you will need to calculate the standard error of \bar{x} . You can use the calculator function in Minitab or any calculator for this calculation. Remember, the

$$\text{equation is } \frac{\sigma}{\sqrt{n}} = \frac{3}{\sqrt{49}} = 0.42857.$$

To calculate the probability in Minitab, click on **Calc → Probability Distributions → Normal**. Select the circle next to **Cumulative probability**. (Cumulative probability 'accumulates' all probability to the left of a specific value.) Enter 64 for the **Mean** and 0.42857 for the **Standard deviation**. Select the circle next to **Input Constant** and enter 63 in the field. Click **OK**.



The Normal probability $P(X \leq 63)$ will be displayed in the Session Window. The probability that the mean height of the women in this sample is less than 63 inches is 0.0098151.



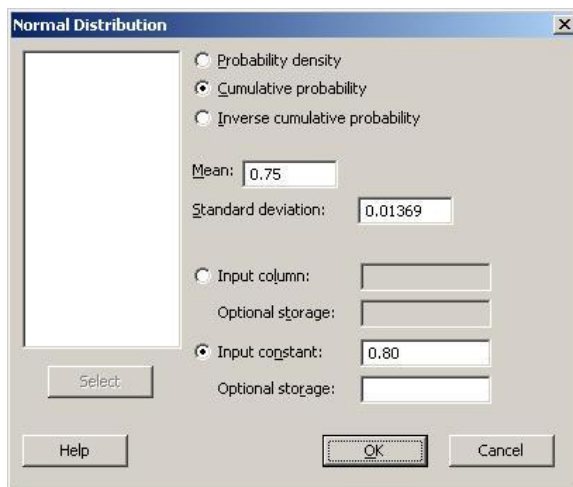
Finding Probabilities Concerning the Sample Proportion

Assume that 75% of all adult Americans have internet access. A random sample of 1000 adult Americans is selected. What is the probability that the sample proportion of those having internet access is less than 80%?

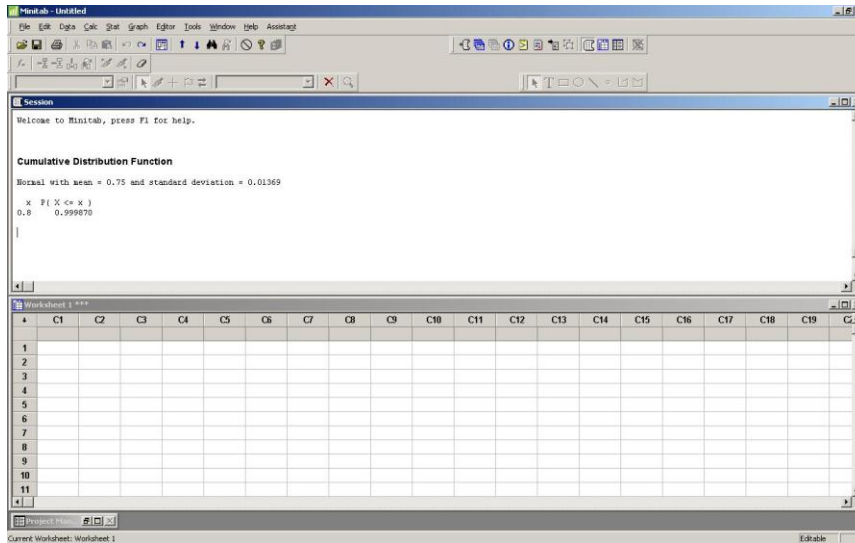
First, by hand, you will need to calculate the standard error of P . You can use the calculator function in Minitab or any calculator for this calculation. Remember, the

$$\text{equation is } \sqrt{\frac{pq}{n}} = \sqrt{\frac{(0.75)(0.25)}{1000}} = 0.01369.$$

To calculate the probability in Minitab, click on **Calc** → **Probability Distributions** → **Normal**. Select the circle next to **Cumulative probability**. (Cumulative probability 'accumulates' all probability to the left of a specific value.) Enter 0.75 for the **Mean** and 0.01369 for the **Standard deviation**. Select the circle next to **Input Constant** and enter 0.80 in the field. Click **OK**.



The Normal probability $P(X \leq 0.80)$ will be displayed in the Session Window. The probability that the sample proportion of those having internet access is less than 80% is 0.999870.



Suggested Exercises

Section 7.4

7.49, 7.51, 7.55

Section 7.7

7.87, 7.89, 7.91

Supplementary Exercises

7.93, 7.95, 7.97

Technology Assignments

TA 7.1