

using TECHNOLOGY

STATDISK Select **Analysis** from the main menu, select **Probability Distributions**, then select the **Binomial Probabilities** option. Enter the requested values for n and p , then click on **Evaluate** and the entire probability distribution will be displayed (or you have the option of entering a single value of x to get a single probability). Other columns represent cumulative probabilities that are obtained by adding the values of $P(x)$ as you go down or up the column.

MINITAB First enter a column C1 of the x values for which you want probabilities (such as 0, 1, 2, 3, 4, 5), then select **Calc** from the main menu. Select the submenu items of **Probability Distributions** and **Binomial**. Select **Probabilities**, and enter the number of trials, the probability of success, and C1 for the input column. Click **OK**.

EXCEL List the values of x in column A (such as 0, 1, 2, 3, 4, 5). Click on cell B1, then click on **f_x** from the toolbar. Select the function category **Statistical** and then the function name **BINOMDIST** (or **BINOM.DIST**). In the dialog box, enter A1 for the entry indicated by **Number_s** (number of successes), enter the number of trials (the value of n), enter the probability, and enter 0 for the cell indicated by **Cumulative** (instead of 1 for the cumulative binomial distribution). A value should appear in cell B1. Click and drag the lower right corner of

cell B1 down the column to match the entries in column A, then release the mouse button. The probabilities should all appear in column B.

TI-83/84 PLUS Press **2ND** **VARs** (to get **DISTR**, which denotes “distributions”), then select the option identified as **binompdf**. Complete the entry of **binompdf(n, p, x)** with specific values for n , p , and x , then press **ENTER**. The result will be the probability of getting x successes among n trials.

You could also enter **binompdf(n, p)** to get a list of *all* of the probabilities corresponding to $x = 0, 1, 2, \dots, n$. You could store this list in L2 by pressing **STO** **L2**. You could then manually enter the values of 0, 1, 2, \dots , n in list L1, which would allow you to calculate statistics (by pressing **STAT**, selecting **CALC**, pressing **ENTER**, then entering **L1, L2**), or view the distribution in a table format (by pressing **STAT**, then selecting **EDIT**).

The command **binomcdf** yields *cumulative* probabilities from a binomial distribution. The command **binomcdf(n, p, x)** provides the sum of all probabilities from $x = 0$ through the specific value entered for x .

STATCRUNCH Click on **Open StatCrunch**, then click on **Stat**. Select **Calculators**, then select **Binomial**.

5-3 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Calculating Probabilities Based on a Saint Index survey, assume that when adults are asked to identify the most unpopular projects for their hometown, 54% include Wal-Mart among their choices. Suppose we want to find the probability that when five adults are randomly selected, exactly two of them include Wal-Mart. What is wrong with using the multiplication rule to find the probability of getting two adults who include Wal-Mart followed by three people who do not include Wal-Mart, as in this calculation: $(0.54)(0.54)(0.46)(0.46)(0.46)$?

2. Consistent Notation If we use the binomial probability formula (Formula 5-5) for finding the probability described in Exercise 1, what is wrong with letting p denote the probability of getting an adult who includes Wal-Mart while x counts the number of adults who do not include Wal-Mart?

3. Independent Events Based on a Saint Index survey, when 1000 adults were asked to identify the most unpopular projects for their hometown, 54% included Wal-Mart among their choices. Consider the probability that among 30 different adults randomly selected from the 1000 who were surveyed, there are at least 18 who include Wal-Mart. Given that the subjects surveyed were selected without replacement, are the 30 selections independent? Can they be treated as being independent? Can the probability be found by using the binomial probability formula? Explain.

4. Notation of 0+ Using the same survey from Exercise 3, the probability of randomly selecting 30 of the 1000 adults and getting exactly 28 who include Wal-Mart is represented as $0+$. What does $0+$ indicate? Does $0+$ indicate that it is impossible to get exactly 28 adults who include Wal-Mart?