using TECHNOLOGY

MINITAB Enter the numbers of defects (or items with any particular attribute) in column C1. Select the option **Stat,** then **Control Charts, Attributes Charts,** then **P.** Enter C1 in the box identified as variable, and enter the size of the samples in the box identified as subgroup size, then click **OK.**

EXCEL Using **XLSTAT:** Begin by entering the numbers of defects or successes in column A. Click on **XLSTAT,** click on **SPC,** then click on **Attribute charts.** Click on the **General** tab and enter the range of data, such as A1:A20. For the "Common subgroup size," enter the sample size that is common to all of the data entries. Place a checkmark next to "Column labels" only if the first cell consists of a name or label. Click **OK** and results will include a p chart.

Using Excel's Chart Wizard: Enter the sample proportions in column A. Click on the **Chart Wizard** icon, which looks like a bar graph. For the chart type, select **Line.** For the chart subtype, select the first graph in the second row, then click **Next.** Continue to click **Next,** then **Finish.** The graph can be edited to include labels, delete grid lines, and so on. You can insert the required centerline and upper and lower control limits by editing the graph. Click on the line on the bottom of the screen, then click and drag to position the line correctly.

STATCRUNCH Click on **Open StatCrunch.** First enter a column containing the numbers of "defects." Click on **Stat,** select **Control Charts,** then select **p.** Identify the column to be used and enter the sample size, then click on **Calculate.** After the control chart is displayed, click on **Next** to get the values of the upper and lower control limits and the centerline.

14-3 Basic Skills and Concepts

Statistical Literacy and Critical Thinking

1. Monitoring the Minting of Half Dollars A half dollar is considered to be defective if it deviates substantially from these specifications: The weight is 11.340 g, the diameter is 30.61 mm, the thickness is 2.15 mm, the composition is 8.33% nickel and 91.67% copper, the edge has 150 reeds, and it is stamped correctly. For the same manufacturing process considered in this section, defects are monitored and the accompanying control chart is obtained. Does this process appear to be within statistical control? If not, identify any out-of-control criteria that are violated. Is the manufacturing process deteriorating?
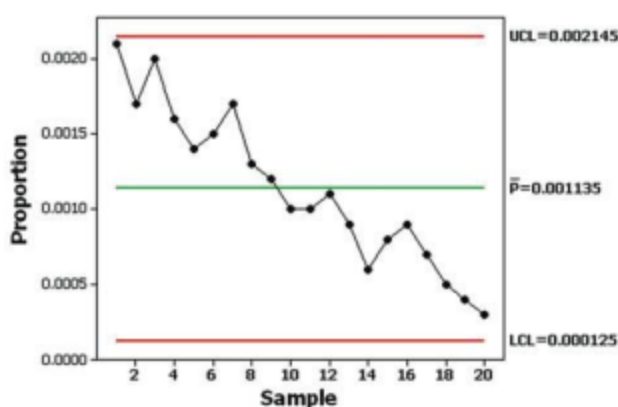
2. Notation The control chart for Exercise 1 shows a value of $\bar{p} = 0.001135$. What does that value denote, and how is it obtained?

3. Control Limits In constructing a control chart for the proportions of defective dimes, it is found that LCL $= -0.000025$. What does "LCL" represent, and how should that value be adjusted?