

HISTOGRAMS ON THE TI-83 AND TI-84 GRAPHING CALCULATORS

This handout will show you how to draw **histograms** on the TI-83 and TI-84 calculators. Make sure the **Airliner Age** data is in list L_2 and the **Part Time Worker** data is in list L_3 . **Proofread the data sets carefully and correct any typographical errors.** Now that both data sets are in your calculator, we are ready to begin.

TURN OFF THE ALGEBRAIC GRAPHS

Before we can draw histograms, we must turn the “function graphs” (algebraic equations) **OFF**. Here are the steps:

- Press the **Y=** key to enter the function editor.
- As shown in Figure 1, there are two equations stored here.

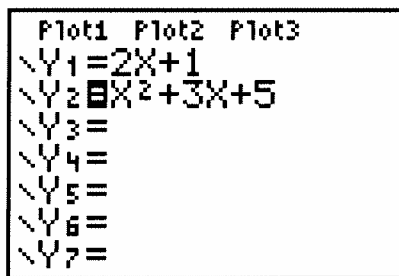


Figure 1

Equation Y_1 is **OFF** because the equal sign is light (not highlighted). Equation Y_2 is **ON** because the equal sign is dark (highlighted).

If the equations are left ON, their graphs will interfere with the histograms. To deactivate Equation Y_2 , position the cursor **directly on top** of the equal sign and press **ENTER**.

DEFINE THE AIRLINER AGES HISTOGRAM

The **Airliner Ages** data is stored in list L_2 .

To define this histogram, follow these steps:

- Press **2nd STATPLOT** to enter the statistical plotting menu. (See Figure 2.)
- Press **1** to select PLOT 1. (See Figure 3.)



Figure 2

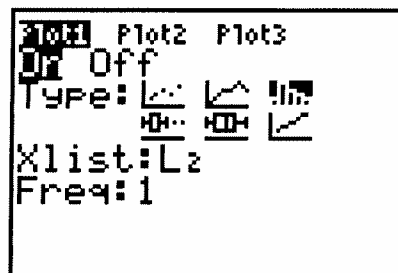


Figure 3

As shown in Figure 3, specify the plotting parameters.

Use the **ENTER** and **arrow** keys to navigate around the menu.

Activate the plot by highlighting **ON**.

Choose the type by highlighting the **histogram icon**.

Specify the Xlist. The Airliner Age data is in list **L₂**.

The frequency is **1** because each observation represents one airplane

The calculator will automatically scale and draw the histogram.

Press **ZOOM** and then **9** (the **ZoomStat** option). See Figure 4.

The histogram is shown in Figure 5.

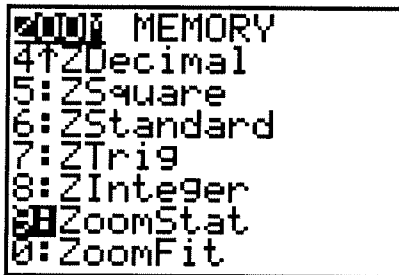


Figure 4

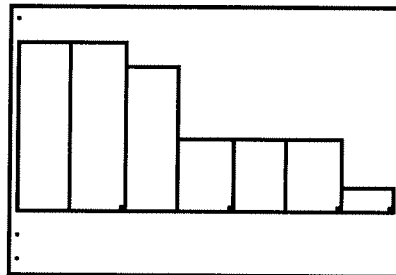


Figure 5

The **Airlines Ages** histogram is **neither bell shaped nor symmetric**.

The histogram is **skewed to the right** because the right tail is the longer than the left tail.

USE THE “WINDOW” MENU TO MANUALLY SCALE THE GRAPH

The histogram shown in Figure 6 below was **automatically scaled** by the calculator.

Press the **TRACE** key and use the **arrows** to move from cell to cell.

As shown, the **third cell** of the histogram contains 6 observations.

The upper and lower cell boundaries are 9.233 and 13.75, respectively.

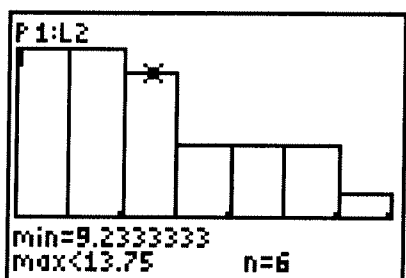


Figure 6

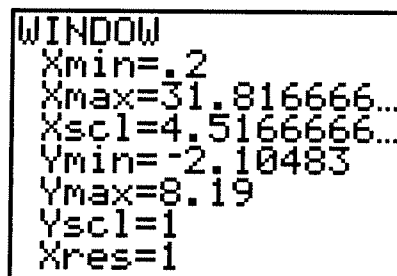


Figure 7

Press the **WINDOW** key to view the scaling that the calculator used. See Figure 7.

The histogram began at $X_{min} = .2$ and ended at $X_{max} = 31.81666$.

A new cell was created every $X_{scl} = 4.51666$ units.

To make the histogram **easier to understand** we could use a different number of cells or different cell boundaries.

STURGES' RULE

Sturges' Rule suggests the appropriate number of histogram classes for the data set. The rule is based on powers of 2.

$$2^3 = 8 \quad 2^4 = 16 \quad 2^5 = 32 \quad 2^6 = 64 \quad 2^7 = 128 \quad \text{etc.....}$$

To find the number of classes, c , bracket the number of observations, n , between two consecutive powers of 2.

$$2^{c-1} < n < 2^c$$

The Airliner Ages data contains 30 observations. According to Sturges' Rule, the histogram should contain **5 classes**

$$\begin{aligned} 16 < n < 32 & \quad (\text{The number of observations is between 16 and 32.}) \\ 2^4 < 30 < 2^5 & \quad (\text{The histogram should contain } \mathbf{5} \text{ classes.}) \end{aligned}$$

CHOOSE THE NEW SCALING

The smallest and largest values in the data set are 0.2 and 27.3. Our histogram could go from 0 to 30 with 5 classes of width 6. These new boundaries and cell widths are easier for humans to understand.

Press **WINDOW** and manually change the settings. Feel free to experiment.

- Xmin = 0 Start the graph at zero.
- Xmax = 30 End the graph at 30.
- Xscl = 6 Start a new cell every 6 units.
- Ymin = -2 Leave room under the graph for annotations.
(Pick a convenient negative number.)
- Ymax = 12 Leave room for up to 12 obs. in a cell.
This is a guess. Increase or decrease as needed.
- Yscl = 1 Put a tick mark on the y axis every 1 unit.
- Xres = 1 I don't know what it does, so leave it alone.

Press **WINDOW** to see the settings shown in Figure 8.

Press **TRACE** or **GRAPH** to see the histogram in Figure 9.

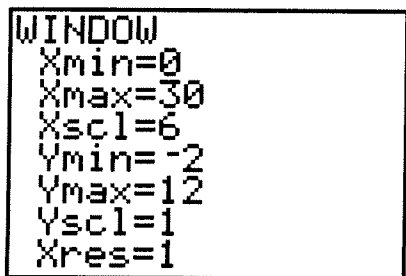


Figure 8

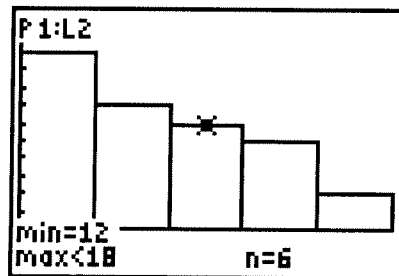


Figure 9

CONCLUSION

The right number of classes and meaningful cell boundaries make the histogram easy to understand.