The Binomial Distribution Using the TI-89

By

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Textbook Correlation: Key Topic

- Binomial Distribution
- Probability Distribution
- Histogram

NCTM Principles and Standards:

- Process Standard
    - Representation
    - Connections
    - Problem Solving

Description

The purpose of this activity is to apply the binomial probability distribution function, the binomial cumulative density function, and a histogram to analyze the probability of an outcome.

A True –False test has ten items. Count the number X of correct answers. There are n = 10 observations. Successive outcomes are independent. Each answer falls into one of only two categories, success or failure. The probability of a success (a correct answer) is p = 0.5 for each question.

a) What is the probability of answering correctly exactly 4 questions?

Solution:

Method I.
Place the cursor in the entry line on the **HOME** screen. Select the binomial probability distribution function, "**binomPdf''** from **CATALOG**, **F3 Flash Apps**. Press enter to paste the command on the entry line of the **HOME** screen. Complete the command by entering **10, .5, 4)** for n, p and X respectively and the right parenthesis key.
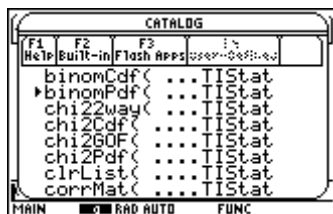
The **answer** is **.205078** or approximately **20.5%**.

Method II.
If we want to **obtain the list for all eleven outcomes**, we can type the command in the list editor as illustrated below. Enter all the possible outcomes in **list1**. Highlight **list2**, paste the **binomPdf** command from **CATALOG**, **F3 Flash Apps**, and type **10, .5, list1** to complete the command.
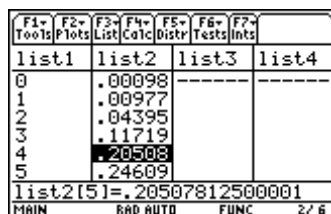
b) Draw a histogram of the binomial distribution.

The following screens illustrate the procedures to draw the histogram. In the list editor press **F2** for Plots. **Select 1: Plot Setup**. Highlight Plot 1 and press F1 for Define. Select **4:Histogram** for Plot Type. Type **list1** for x, **1** for Hist. Bucket Width, select **Yes** for Use Freq and Categories?, and type **list2** for Freq (frequency).
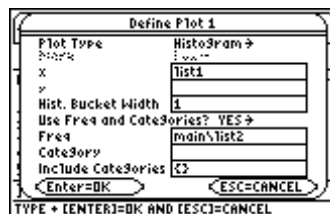
Press the **green diamond key** and **F1** to enter the equation editor. Make sure Plot 1 is selected. The check mark indicates that it is selected. F4 is a toggle for selecting and deselecting functions. Press the **green diamond key** and **F2** to enter the window editor. Assign the window settings displayed in the middle screen below. Press the **green diamond key** and **F3** to graph the histogram. Press **F3** and the right (left) arrow key to trace.
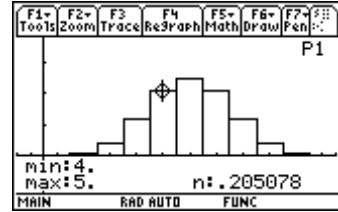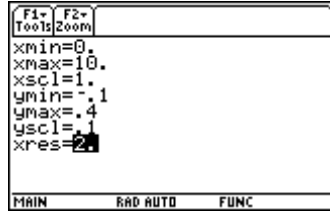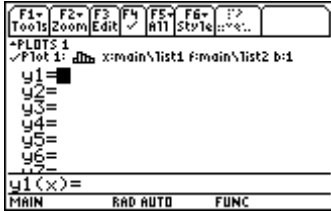
c) **What is the probability of answering correctly at most 4 questions?**

Solution:

The following screens portray how to use the binomial cumulative density function, "**binomCdf"** command in either of the two methods described in part a.
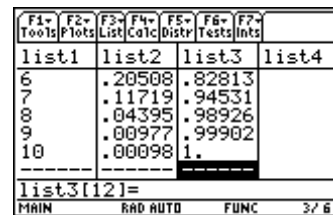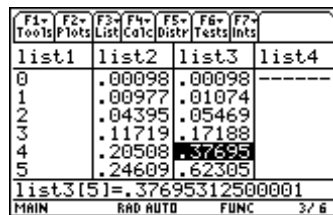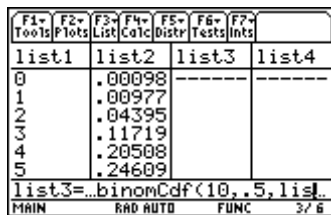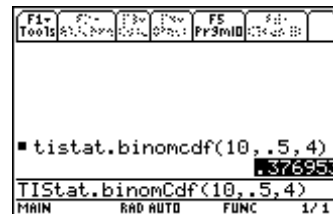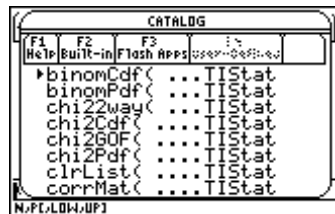
The **answer** is **.376953** or approximately **37.7%**.

References

Connors, M.A. and Connors, E.A. (in press). "Statistics With The TI-89 Statistics Flash Application And List Editor," *Proceedings of the Fourteenth International Conference on Technology in Collegiate Mathematics, Baltimore, MD*, November 1-4, 2001. Reading, MA: Addison Wesley.