Calculating and Graphing the Binomial Distribution

The binompdf function is used to generate the probability of values in the binomial distribution. The syntax of the binompdf function is

\[
\text{binompdf}(n, p, x)
\]

The optional third parameter is the number of successes. If omitted, the function gives a list of all of the outcomes.

If a binomial trial has a 70% probability of success, then if 10 trials are to be made, the probability of exactly 6 successes is found as follows.

Access the DISTR functions (2nd VARS) and go down to the binompdf function (note that the menu location may be different on the TI-83 and TI-84 calculators).

Enter the number of trials (10), the probability of success (.70) and the number of successes we are looking for (6). Press ENTER to get the results.

You can use the binompdf function to load all of the probabilities into a list. Shown below we store the probabilities for all outcomes in 10 trials with a probability of .70 in list L6.
We can use the list of probabilities together with a list of values to graph the probability histogram. With the probabilities stored in list \textbf{L6} as above, enter the number of successes that correspond in another list. Here we have entered them into list \textbf{L5}.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{L4} & \textbf{L5} & \textbf{L6} \\
\hline
\hline
0 & 5.9E-6 & \\
1 & 1.4E-4 & \\
2 & 0.00145 & \\
3 & 0.009 & \\
4 & 0.03676 & \\
5 & 0.10292 & \\
6 & & 0.20012 \\
\hline
\end{tabular}
\end{table}

\textbf{L5(7)}=6

Enter the success values from 0 to 10

Now we can set up the histogram to graph the probability distribution. Note that the numbers of successes is in the \textbf{Xlist} and the probabilities are in the \textbf{Freq} list.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{L4} & \textbf{L5} & \textbf{L6} \\
\hline
5 & 0.10292 & \\
6 & 0.20012 & \\
7 & 0.26683 & \\
8 & 0.23347 & \\
9 & 0.12106 & \\
10 & & 0.02825 \\
\hline
\end{tabular}
\end{table}

\textbf{L5(12)}=

Remember the window settings must be entered directly. In this case, the discrete values are from 0 to 10, so the continuous values start at -0.5 and go to 10.5, and we want the width of each bar to be 1 unit. The Ymax value is a little bigger than the largest probability in our list. The Yscl setting of 0.1 shows the scale marks on the left of the graph. Below is the resulting histogram.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{histogram}
\caption{Probability histogram for 10 trials with \textit{p}=0.70}
\end{figure}