

Stat 205: Binomial examples

Your TI-84 can compute binomial probabilities; I'll give some examples below. Other TI's may work similarly.

Let $Y \sim \text{bin}(n, p)$. Your TI computes probabilities of the form $P(Y = y)$ and $P(Y \leq y)$ for $y = 0, 1, 2, \dots, n$. The former is given by the TI function `binompdf(n,p,y)` and the latter is given by `binomcdf(n,p,y)`

- To access these functions turn on your TI-84: `ON`
- Get rid of the last thing you worked on if it's there: `CLEAR`
- Access the distribution functions: `2ND` `VARS`
- Hit the down button (upper right) several times `↓` until you see the binomial pdf function; on mine it looks like...
- `A:binompdf(` hit `ENTER` and at the top of the screen you'll see
- `binompdf(` fill in the rest:
- For Exercise 3.27(a) it will be `binompdf(4,0.42,0)` `ENTER` you'll (hopefully) see:
- `.11316496`
- We really only need to report these to 2–3 decimal places. I'd write $P(Y = 0) = 0.113$.
- For 3.27(d) try `binomcdf(4,0.42,2)` `ENTER` and you'll see
- `.79699888` NOTE: “cdf” instead of “pdf” in the function! This gives $P(Y \leq 2)$.
- That's part (a) and (d). For part (e) note that
- $P(Y \leq 2) = P(Y = 0 \text{ or } 0 < Y \leq 2) = P(Y = 0) + P(0 < Y \leq 2)$, so $P(0 < Y \leq 2) = P(Y \leq 2) - P(Y = 0) = 0.797 - 0.113 = 0.684$ from above.

Homework in R. R is a free statistical computing and graphics package that is extremely powerful, and is gaining popularity with researchers across many fields. This is partly due to the fact that people have been contributing their own packages of R functions to do specialized, advanced, and often complex statistical analyses – freely available to anybody. R can also do many important, routine calculations, analyses, and provide common graphical displays used in this course. If you want to try R (and this is certainly *not* required), you can download it and install it from CRAN: <http://cran.r-project.org/>

Under **Download and Install R** click on your platform (Linux, MacOS X, or Windows). I have Windows, so I'll click on that. Then click on **base** and on the next page click on **Download R 2.11.1 for Windows** (this is the latest release when I wrote this). Click **Save File** and when it's done downloading run the executable by clicking on it – alternatively you can choose to **Run Program** directly after downloading from the web. I'm assuming you have some experience installing programs off of the web. The installation program will ask you a series of questions; I always simply choose the defaults. (e.g. English language, the suggested installation folder, the checked selected components to install, not to customize startup options, shortcut in the Start Menu, and additional tasks). When it's done, click on the new R desktop icon. Click on the console. This is where you will type commands to R. To obtain the above binomial probability type the following and verify that you get the same probability:

```
> dbinom(0,4,0.42)
[1] 0.1131650
```

The second probability is obtained

```
> pbinom(2,4,0.42)
[1] 0.7969989
```

To see the options for these functions type

```
> help(dbinom)
```

The “learning curve” for R is quite a bit steeper than the TI calculator, but if you are planning on analyzing your own data at some point, learning R may be useful. Plus, it's free! R's documentation is not stellar, but there are some tutorials. Under **Help** choose **Manuals (in PDF)** and choose **An introduction to R**. This can get you started.

If you want to use R for your homework, I'll give you a skeleton set of commands to get the basic job done with no frills. R is unforgiving if you type the wrong command; it's error messages can be cryptic and therefore R is not as “user friendly” as other packages such as SAS, Stata, or even Excel. However it's free, and it's now being commonly used by hundreds of thousands of people. If interested, Google “how many r users?” or simply look at <http://bits.blogs.nytimes.com/2009/01/08/r-you-ready-for-r/>.