MATH E-3: week 8

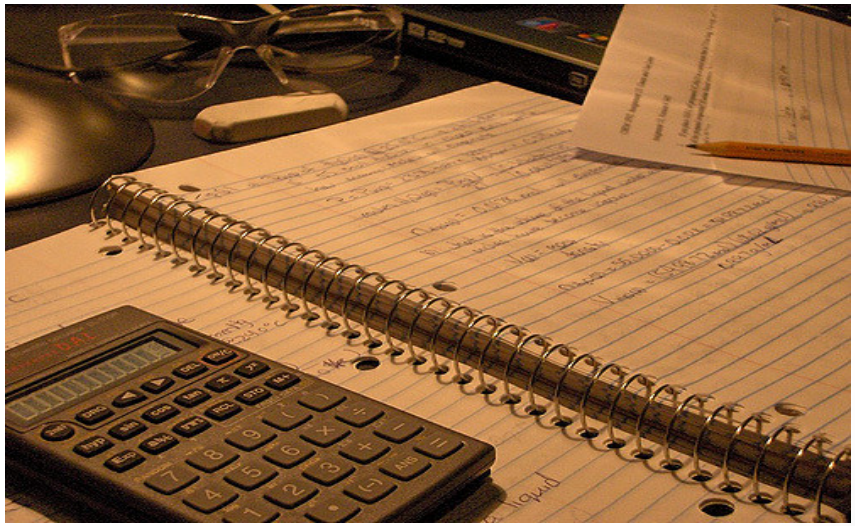
Review of Hypothesis Testing, and Introduction to Excel

Homework

- Assignment 7 is due April 2
- Grades will be available April 9
- Excel Assignment 8 (optional, for extra credit) will be posted tomorrow

Homework Help Section

- Wednesday, March 30
  - Online, Canvas Conferences, beginning at 7:30 pm (ET)



Quiz 2
(Lectures 6-8)

DATE: Tuesday, April 5*

WHEN: available online 7:40 pm (ET) through Wednesday, April 6, 7:40 pm (ET)

*No class meeting or on campus section

You will have 75 minutes to complete the quiz

Quiz 2 Review (Lectures 6-8)

- **Review Section**: Friday, 4/1, beginning at 5:30 pm (ET). Live, online via Canvas Conference; recorded session and slides will be posted shortly thereafter to the Quiz 2 module on the course site home page

- **Practice Test** will be posted soon in the Quiz 2 module

Quiz 2 TIPS

- **Review** readings, homework assignments, lecture slides
- **Watch** the review section video and review section slides
- **Attend** online or on campus help section if needed
- **Complete** the Math E-3 Practice Test

https://www.pinterest.com/pin/521713938058198342/

Math in the News

Meat Is Linked to Higher Cancer Risk, W.H.O. Report Finds

An international panel of experts convened by the World Health Organization in 2015 concluded that eating processed meat like hot dogs, ham and bacon raises the risk of colon cancer and that consuming other red meats "probably" raises the risk as well. But the increase in risk is so slight that experts said most people should not be overly worried about it.

While other substances [that raise the risk of cancer] include alcohol, asbestos and tobacco smoke, they do not all share the same level of hazard (nor do they all have nutritional value).

http://www.nytimes.com/2015/10/27/health/report-links-some-types-of-cancer-with-processed-or-red-meat.html?_r=0

Math in the News . . .

"Smoking causes a roughly 20-fold increase in a person's risk of developing lung and other types of cancer, and every year it results in about a million deaths worldwide. In comparison, a person's risk of colorectal cancer rises by a factor of about 1.1 or 1.2 for every serving of processed meat consumed per day."

Math in the News . . .

Based on this, let's do a little math . . .

Suppose your risk of lung cancer is currently 1% and your risk of colorectal cancer is also 1%.

Math in the News . . .

Based on this, let's do a little math . . .

Suppose your risk of lung cancer is currently 1% and your risk of colorectal cancer is also 1%.

Then if you are or become a smoker, your risk of "lung and other types of cancer" increases by about 20-fold, i.e. to 20%.

Math in the News . . .

Based on this, let's do a little math . . .

Suppose your risk of lung cancer is currently 1% and your risk of colorectal cancer is also 1%.

Then if you are or become a smoker, your risk of "lung and other types of cancer" increases by about 20-fold, i.e. to 20%.

If you consume 1 serving of processed meat per day, your risk of colorectal cancer rises to about 1.1% - 1.2%

Math in the News . . .

So we need to be careful:

a) To compare the risks, and

b) Remember other factors, such as the nutritional benefits of meat, which are not present with smoking

Math in the News . . .

And how about this?

Meat industry cries foul

Meat industry groups slammed the WHO report as biased and misleading.

"They tortured the data to ensure a specific outcome," said Betsy Booren, vice president of scientific affairs at the North American Meat Institute.

http://money.cnn.com/2015/10/26/news/red-meat-processed-cancer-world-health-organization/

Hypothesis Testing Revisited

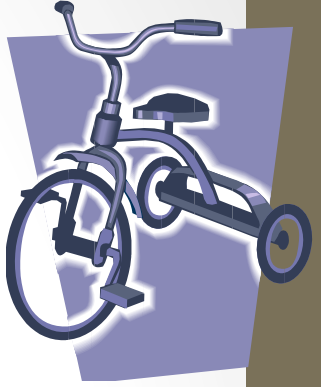
Big Wheel Example

Hypothesis Test Problem

When you buy a Christmas toy for children, it usually needs to be assembled.

Several years ago, my friend learned a valuable and painful lesson. In assembling a 'Big Wheel Bike' there were plenty of bolts, but not enough nuts.

Big Wheel Problem



Each bolt required four (4) nuts to be assembled correctly.
Needless to say, my friend was frantically running around to all the hardware stores in town to find the correct size nuts.

He never put the toys together on Christmas Eve again!

Big Wheel

He says the toy companies probably do not count out the numbers of nuts and bolts, but send them by weight.

A consumer testing service actually did a study of these particular toys as they too suspected that the toy companies do not send the correct proportion of nuts and bolts.

Hypothesis Test

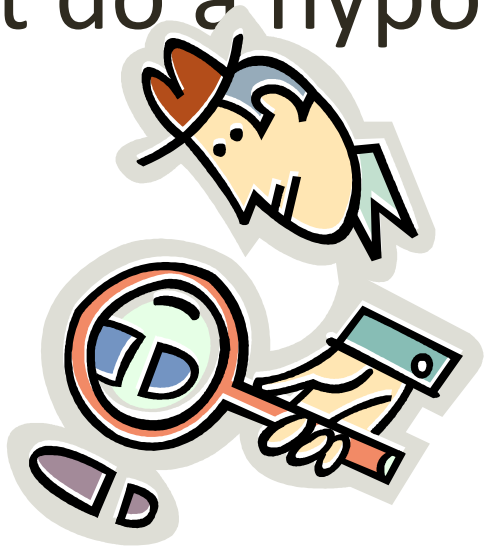
It was found that in a crate of these, there was a total of 900 nuts and bolts all together. They were separated and counted: 160 were bolts. Answer the following questions.

What percent of the total of nuts and bolts should be bolts?

Hypothesis Test

Is the suspicion correct that toy companies do not send the correct proportion of nuts and bolts?

(Hint: you must do a hypothesis test!)



How to get the percentage for NH

Since there are 4 nuts for every bolt, then the bolts represent 1 out of a total of 5 nuts and bolts together.

One out of 5 = 1/5 =.20 =20%.

The percentage of bolts = =20%.

Step 1: Null Hypothesis

Step 1: State the Null Hypothesis

NH: 20% of the total number of nuts and bolts are bolts.

Step 2: Calculating the Standard Deviation

Step 2: Calculate the standard deviation using the claim for p and the number of bolts in the sample for n.

p = 20% n= 900

σ =

$$\sqrt{\frac{.20(1-.20)}{900}}$$

Standard Deviation

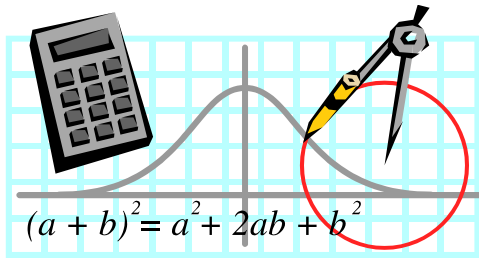
- Going to blackboard to calculate:

$$\sqrt{\frac{.20(1-.20)}{900}}$$

- σ=.013333…or 1.3%

Step 3: Draw the picture

- Going to the blackboard
- Step 3: Draw curve with:
- P=20%
- σ =1.3%

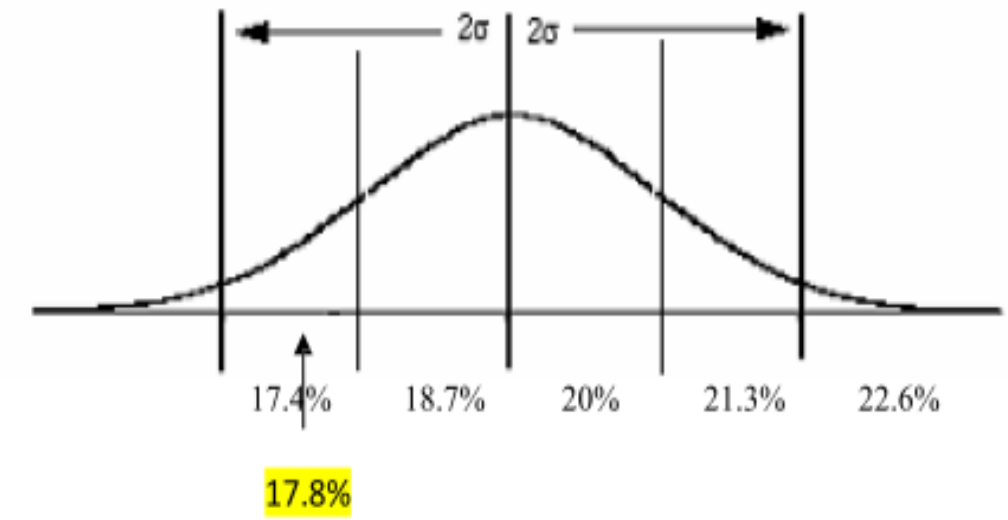


Step 4: Calculate the Observed percentage

Step 4: Compare the percentage that you got in your sample to this interval. If it falls inside, you **cannot** reject. If it falls outside you can reject.

160/900 =. 17777…=17.8%

Completing Step 4: Our observed figure is inside the likely region



Steps 5 and 6: Conclusions

Step 5: Construct the proper 'reject/cannot reject' sentence.

Since our observed percentage falls inside the likely region, we cannot reject the **claim at a 5% level of significance.**

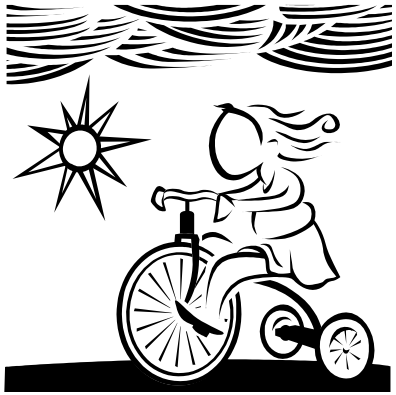
More informally…

Step 6: Write a short concluding statement.

Although, we still do not have the required number of bolts in this sample, we don't have a sufficiently small enough number of them to do something about it like send back the toys. Our best option is to run to a hardware store.

Done!

Now to Excel!



MATH E-3: Lecture 8

(continued…)

Introduction to Microsoft Excel

What is MS Excel?

An electronic spreadsheet, containing “cells” in rows and columns

Each cell is labeled, e.g. A3, G10, etc.

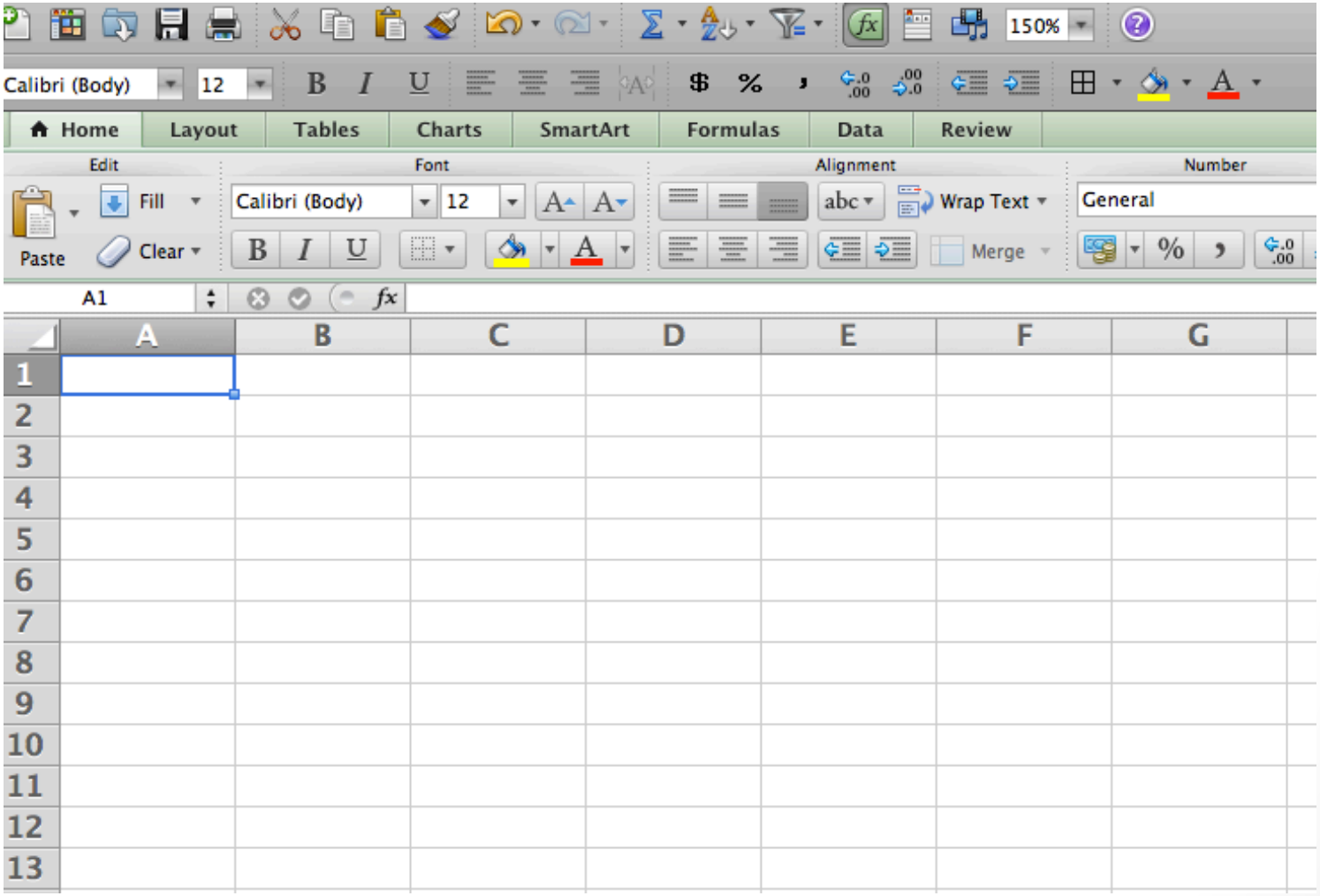
Cells can contain numerical data or text

Cells can be sorted and formatted

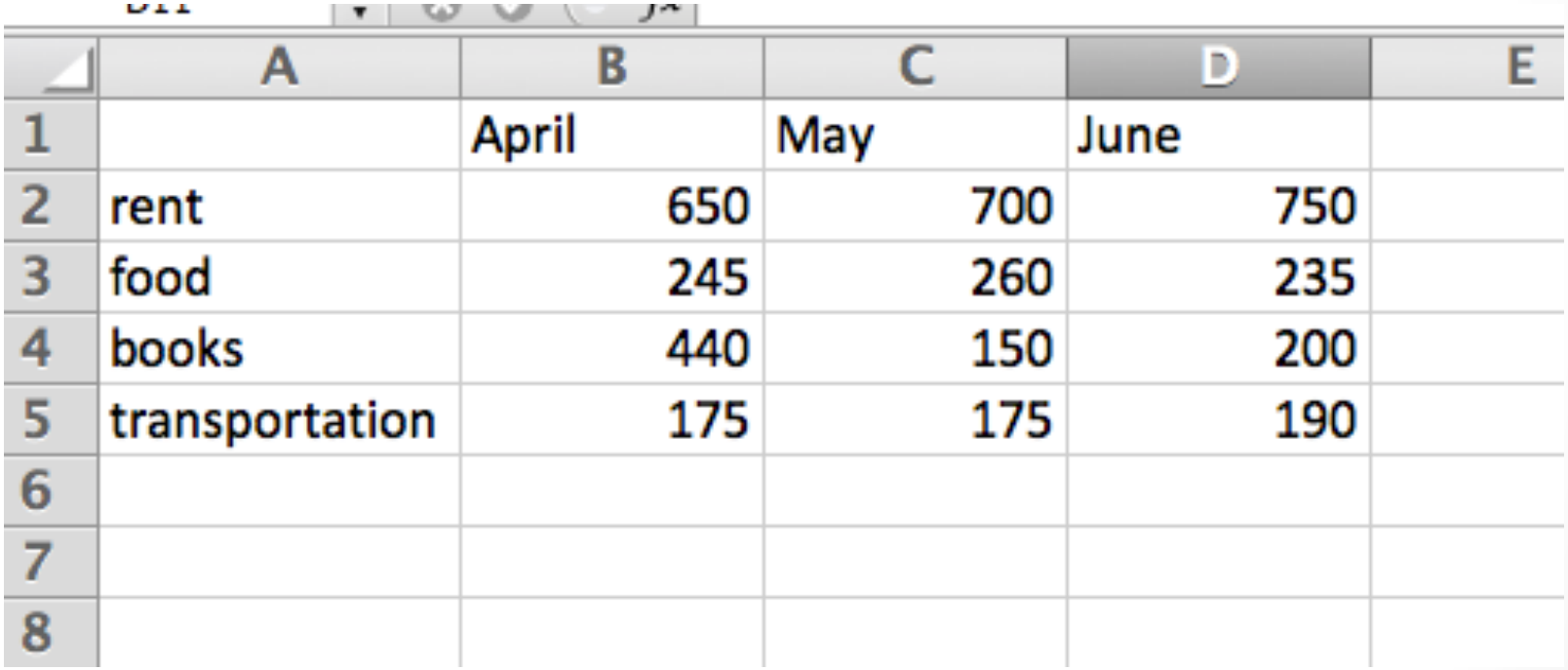
Data from cells can be graphed

Data from cells can be “analyzed” by means of formulas and functions

An Excel spreadsheet with cells (Mac)

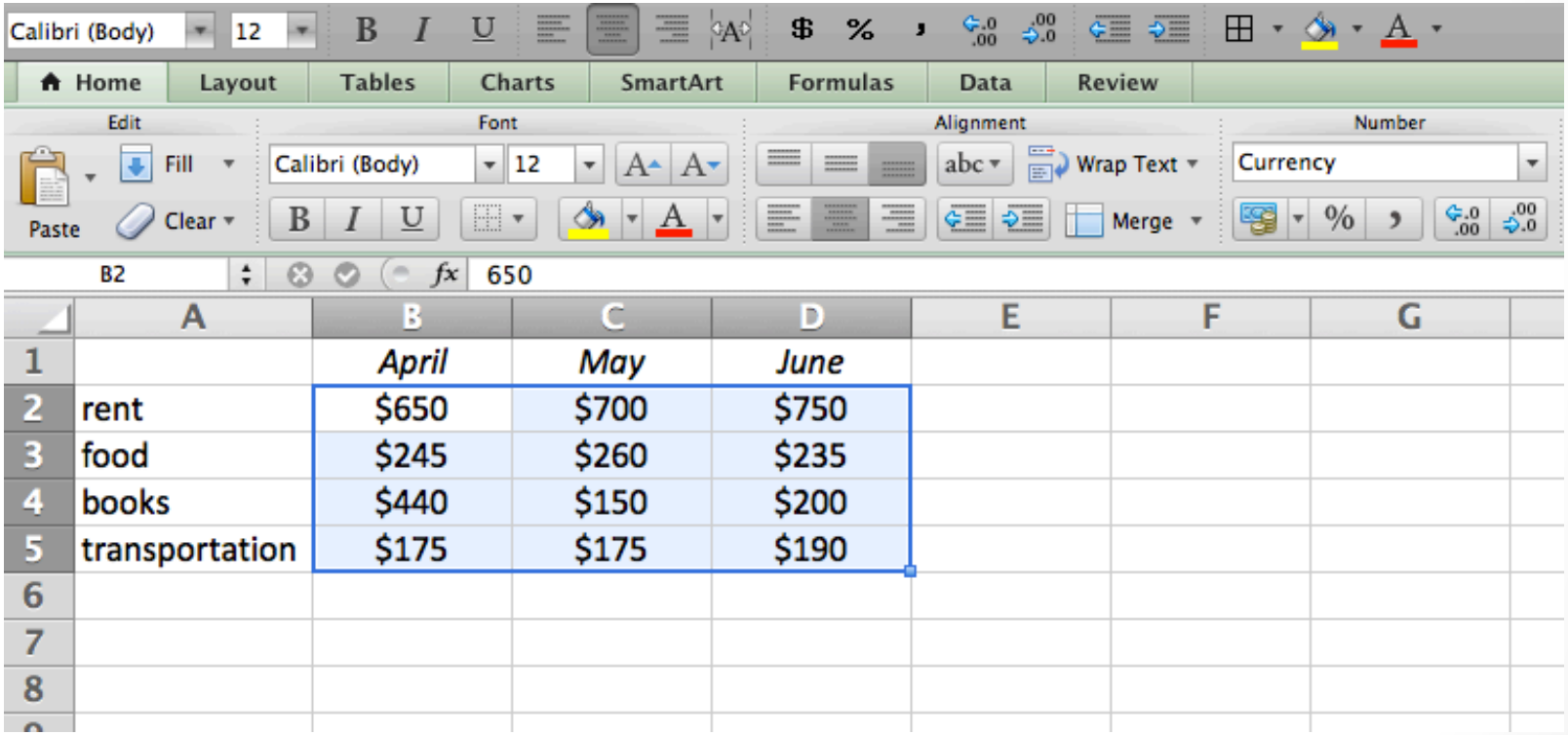


Entering some data . . .



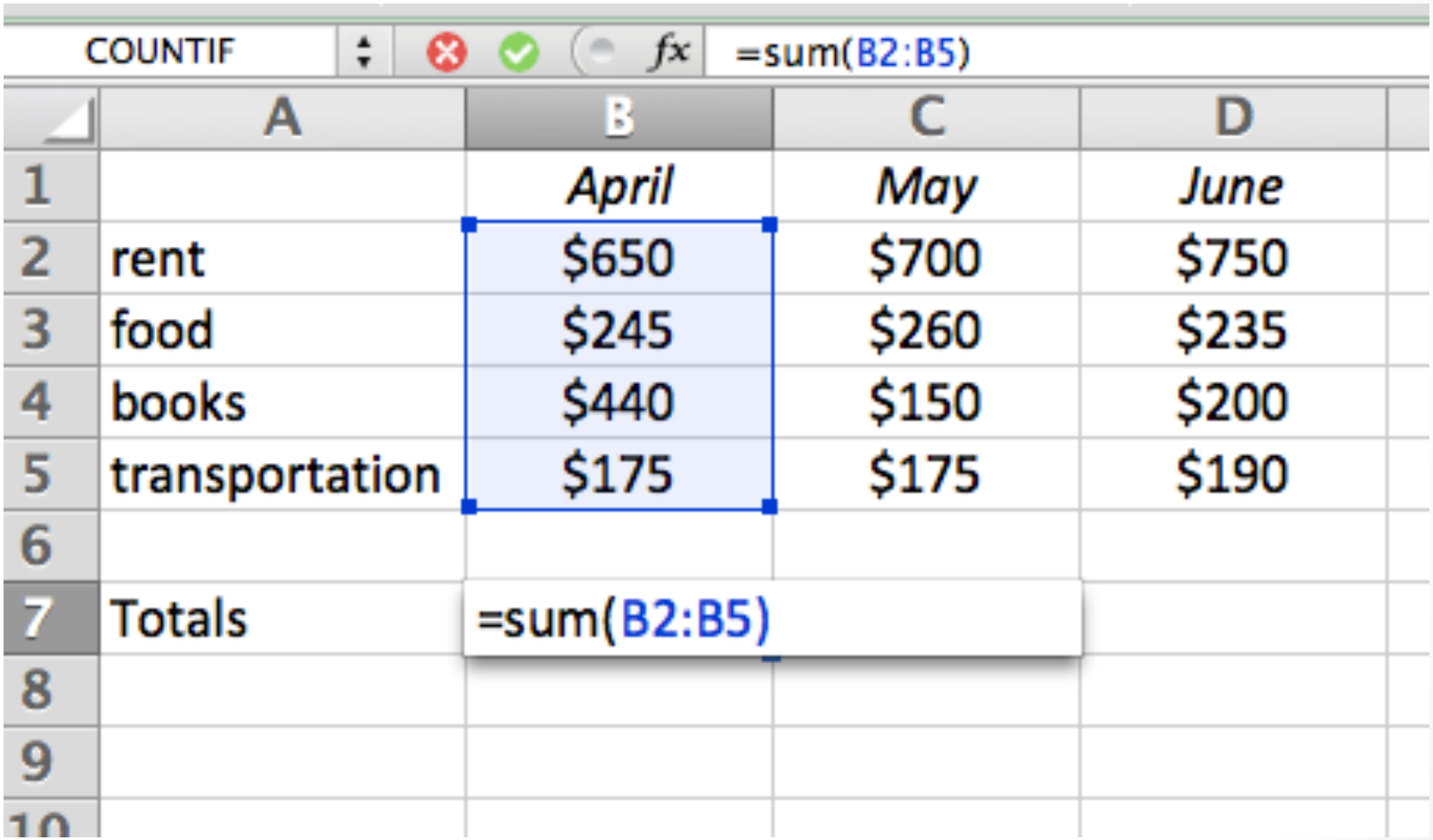
	A	B	C	D	E
1		April	May	June	
2	rent	650	700	750	
3	food	245	260	235	
4	books	440	150	200	
5	transportation	175	175	190	
6					
7					
8					

Formatting the data

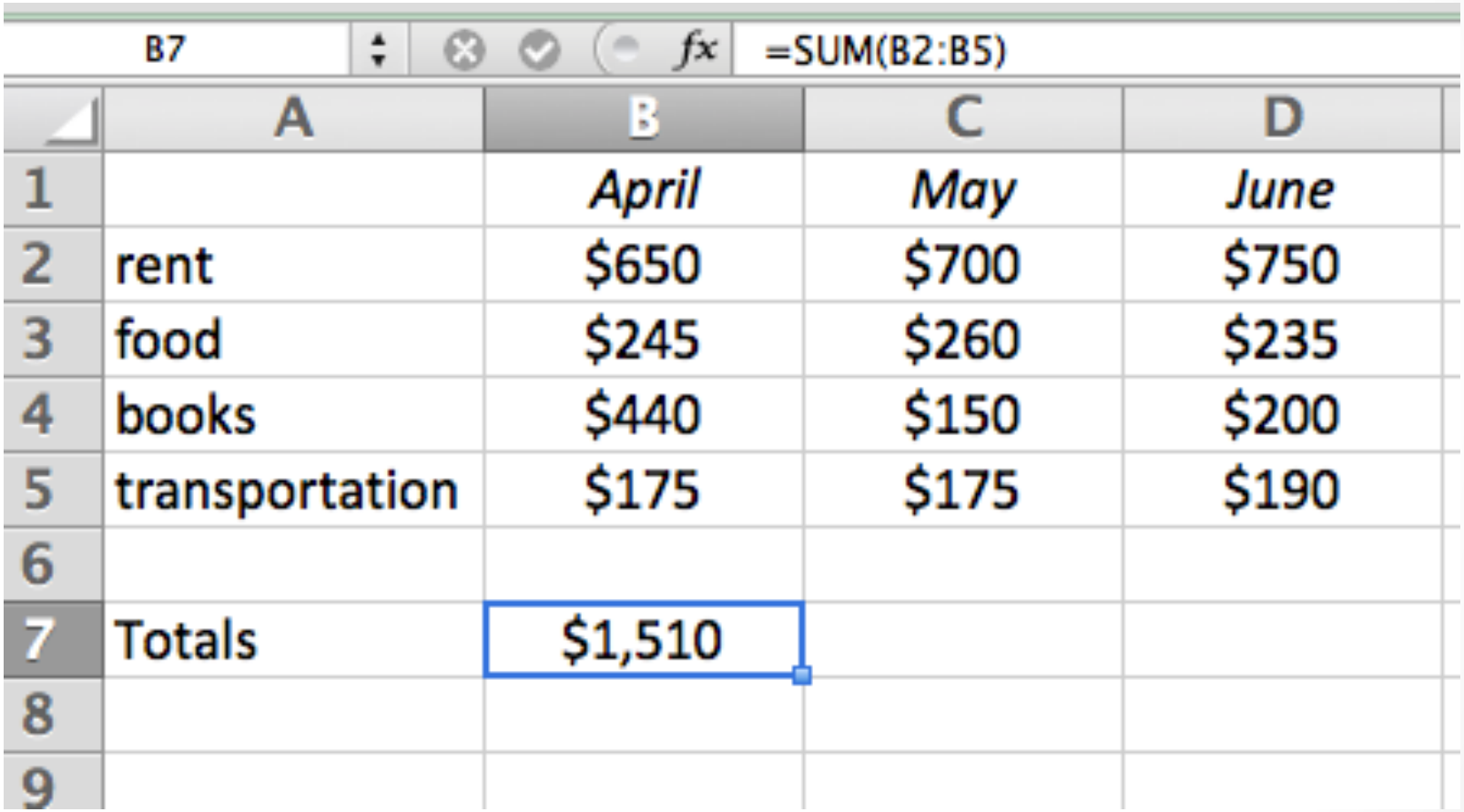


	A	B	C	D	E	F	G
1		*April*	*May*	*June*			
2	rent	$650	$700	$750			
3	food	$245	$260	$235			
4	books	$440	$150	$200			
5	transportation	$175	$175	$190			
6							
7							
8							

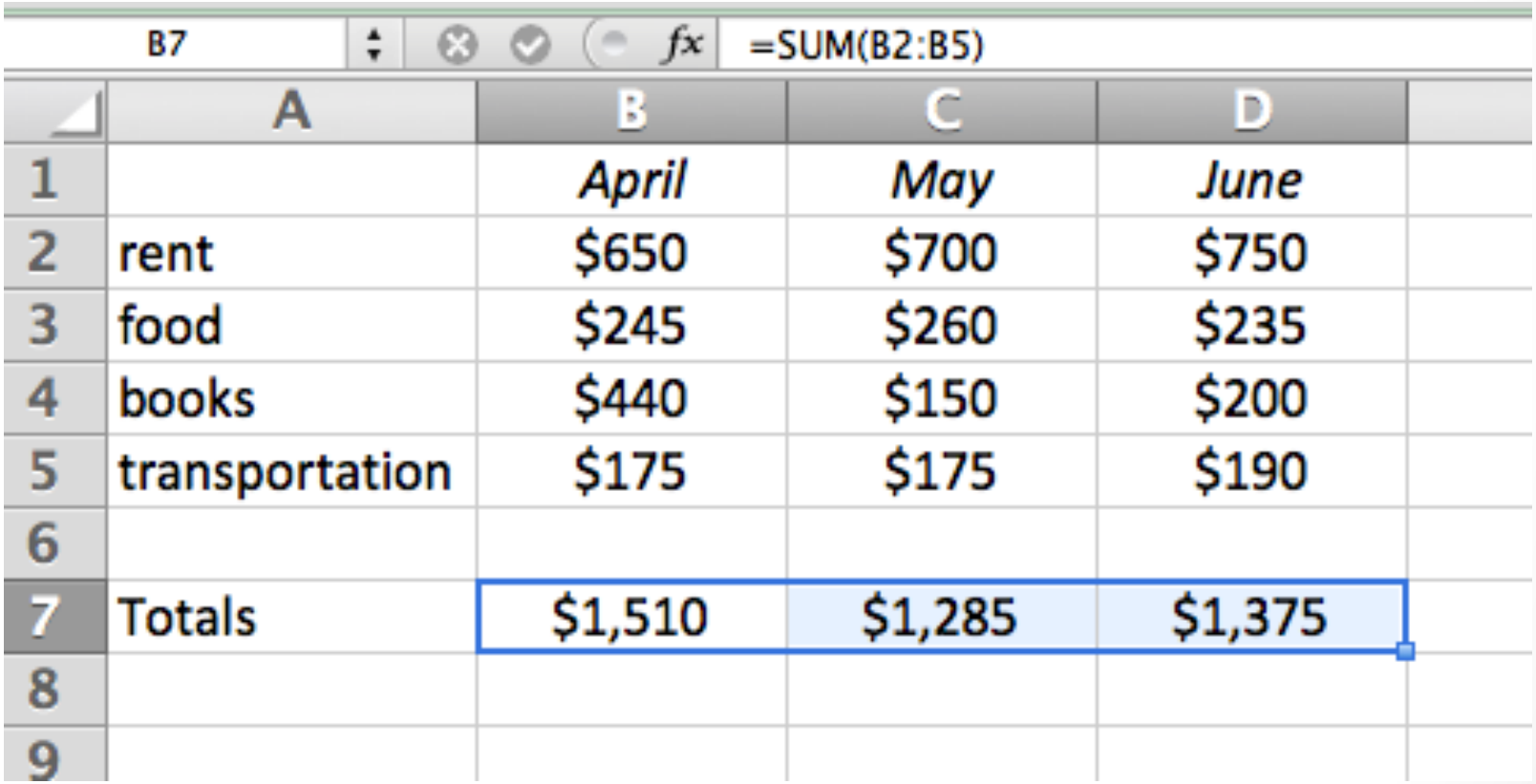
Calculating totals



Just hit “enter” . . .

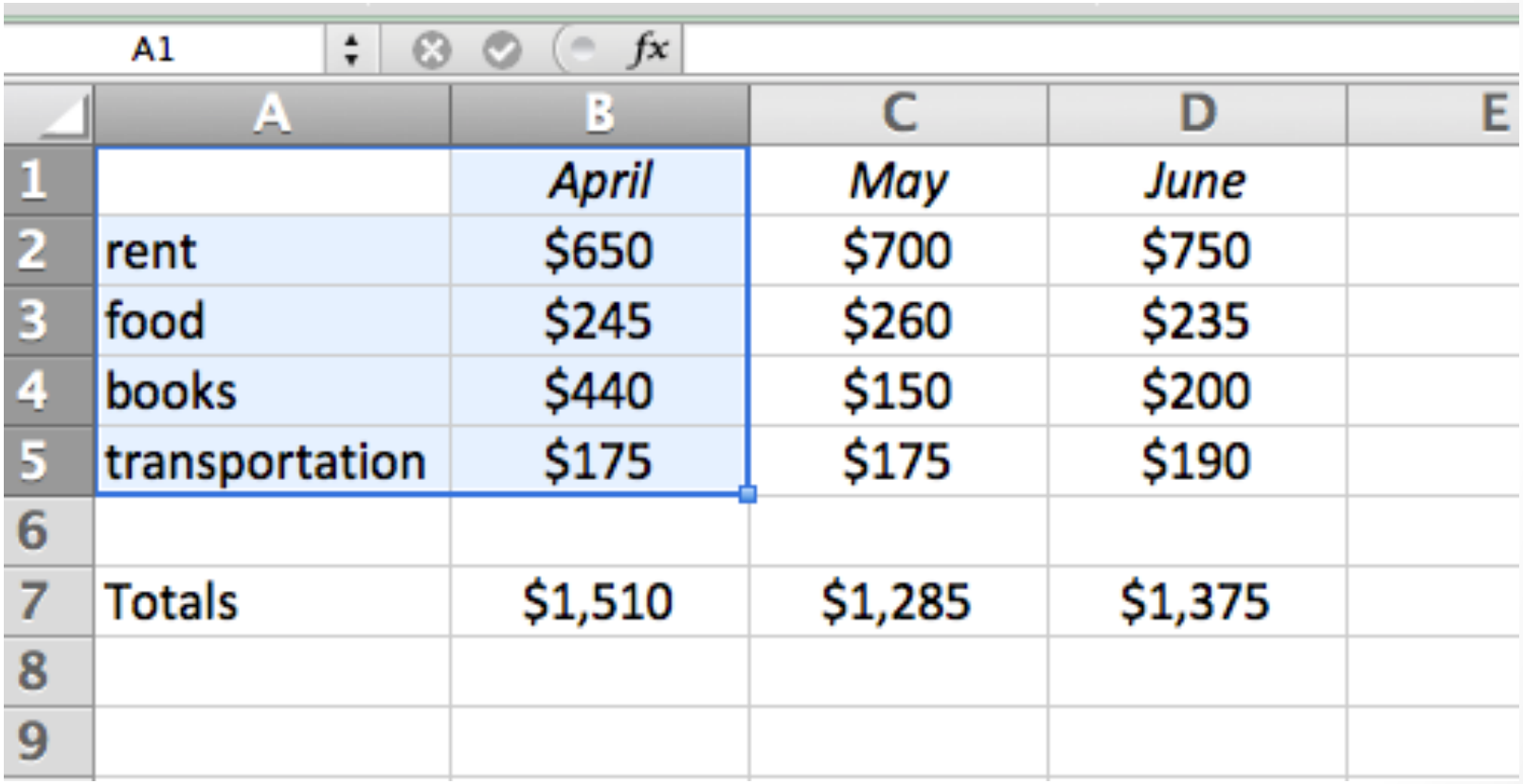


“Fill right” …



	A	B	C	D
1		*April*	*May*	*June*
2	rent	$650	$700	$750
3	food	$245	$260	$235
4	books	$440	$150	$200
5	transportation	$175	$175	$190
6				
7	Totals	$1,510	$1,285	$1,375
8				
9				

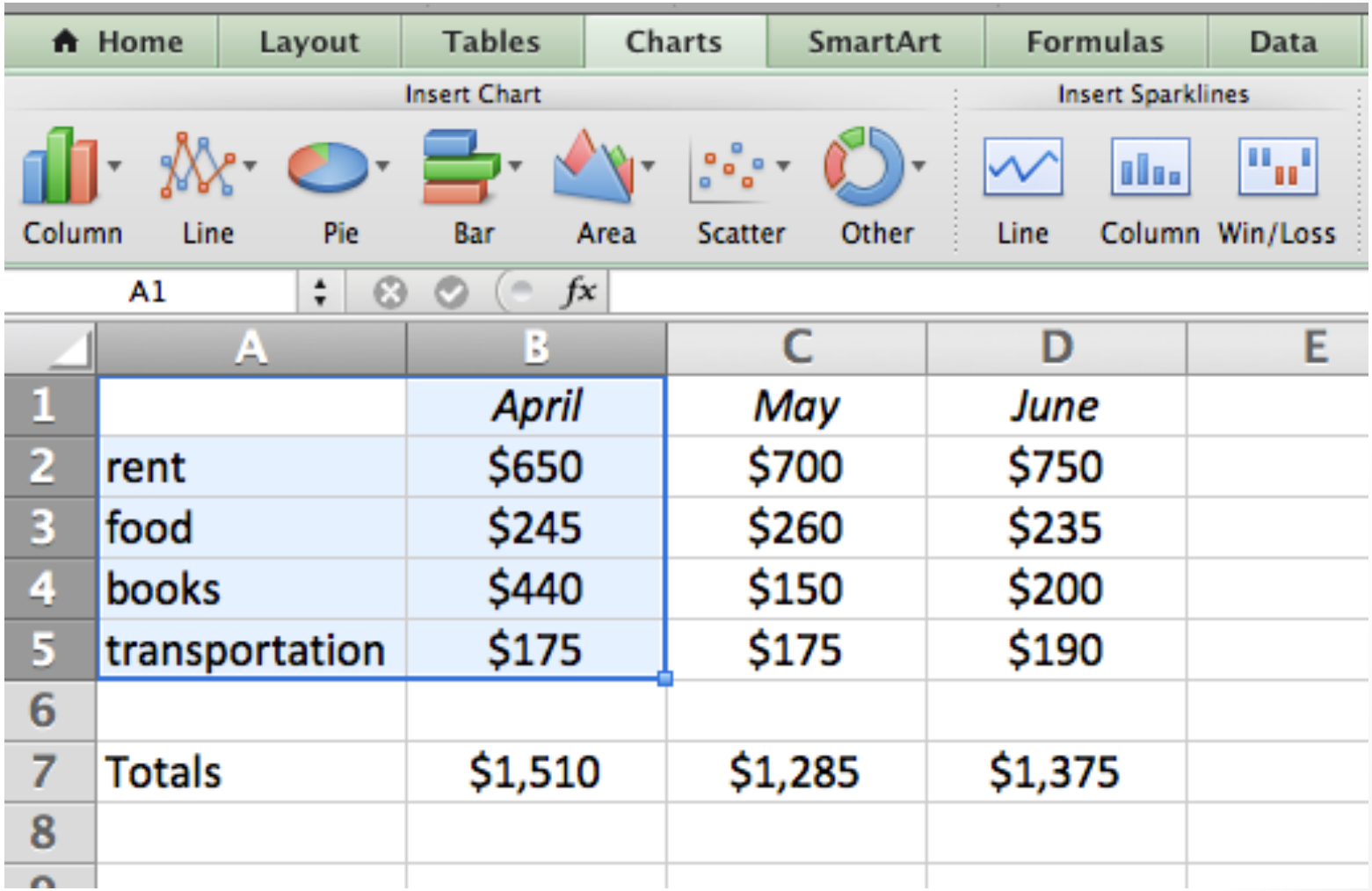
Make a Pie Chart: select the cells



A1

	A	B	C	D	E
1		*April*	*May*	*June*	
2	rent	$650	$700	$750	
3	food	$245	$260	$235	
4	books	$440	$150	$200	
5	transportation	$175	$175	$190	
6					
7	Totals	$1,510	$1,285	$1,375	
8					
9					

Find the Charts menu



	A	B	C	D	E
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6					
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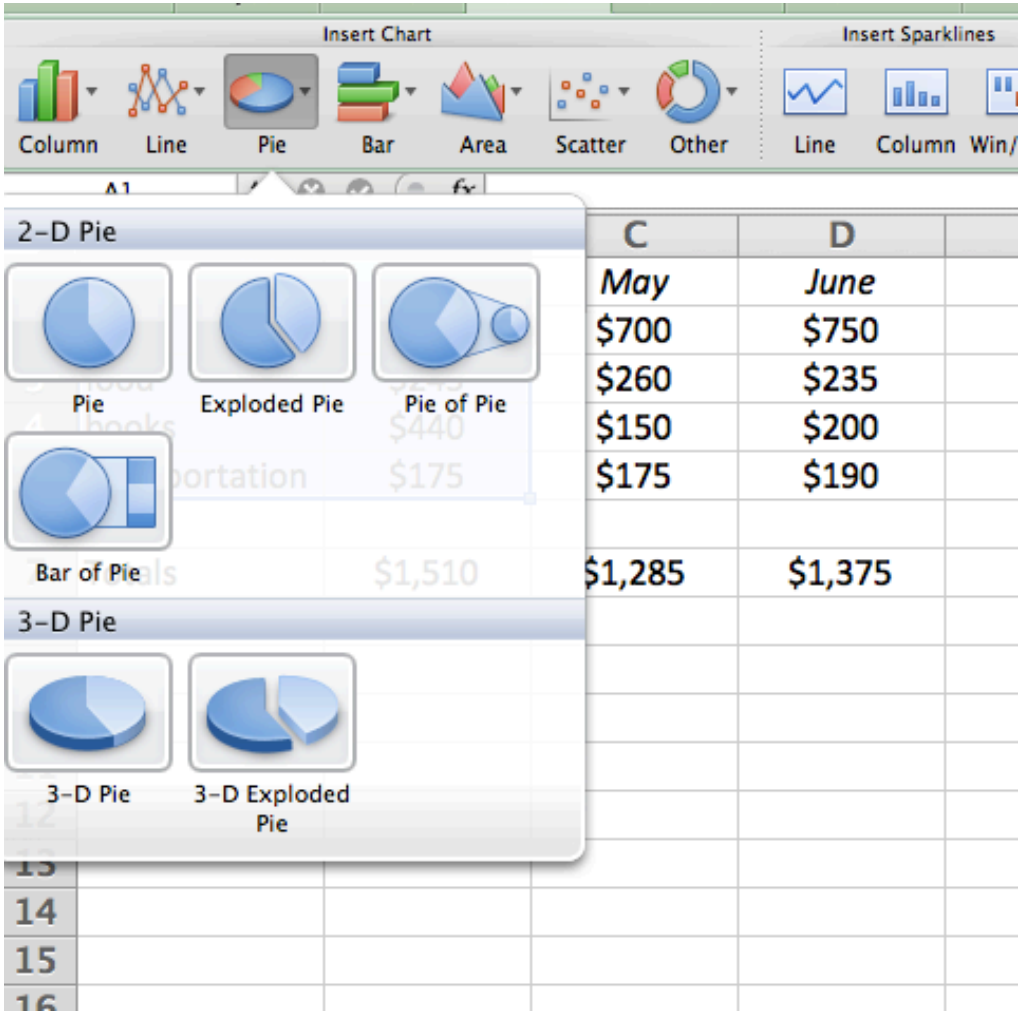
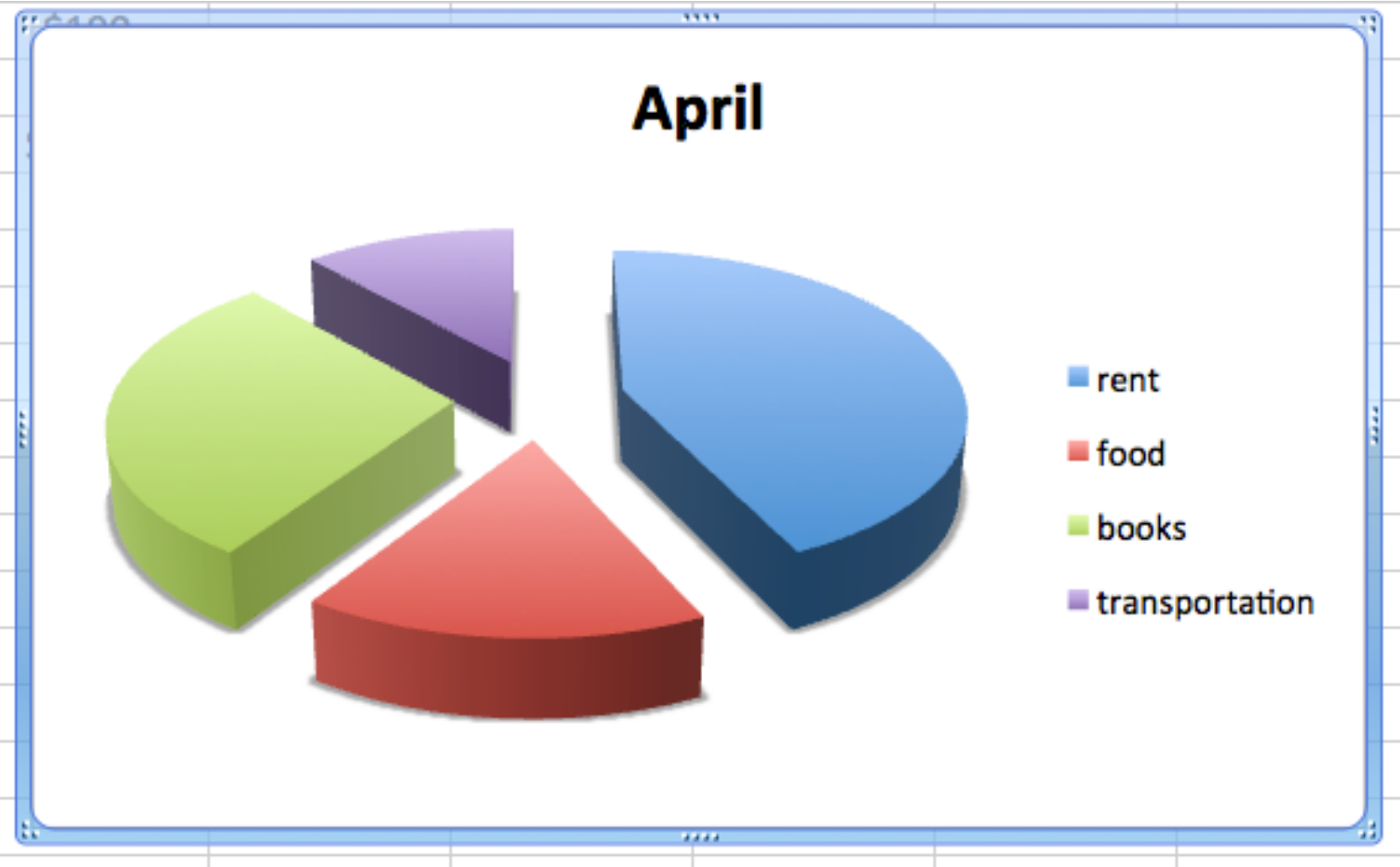
8					

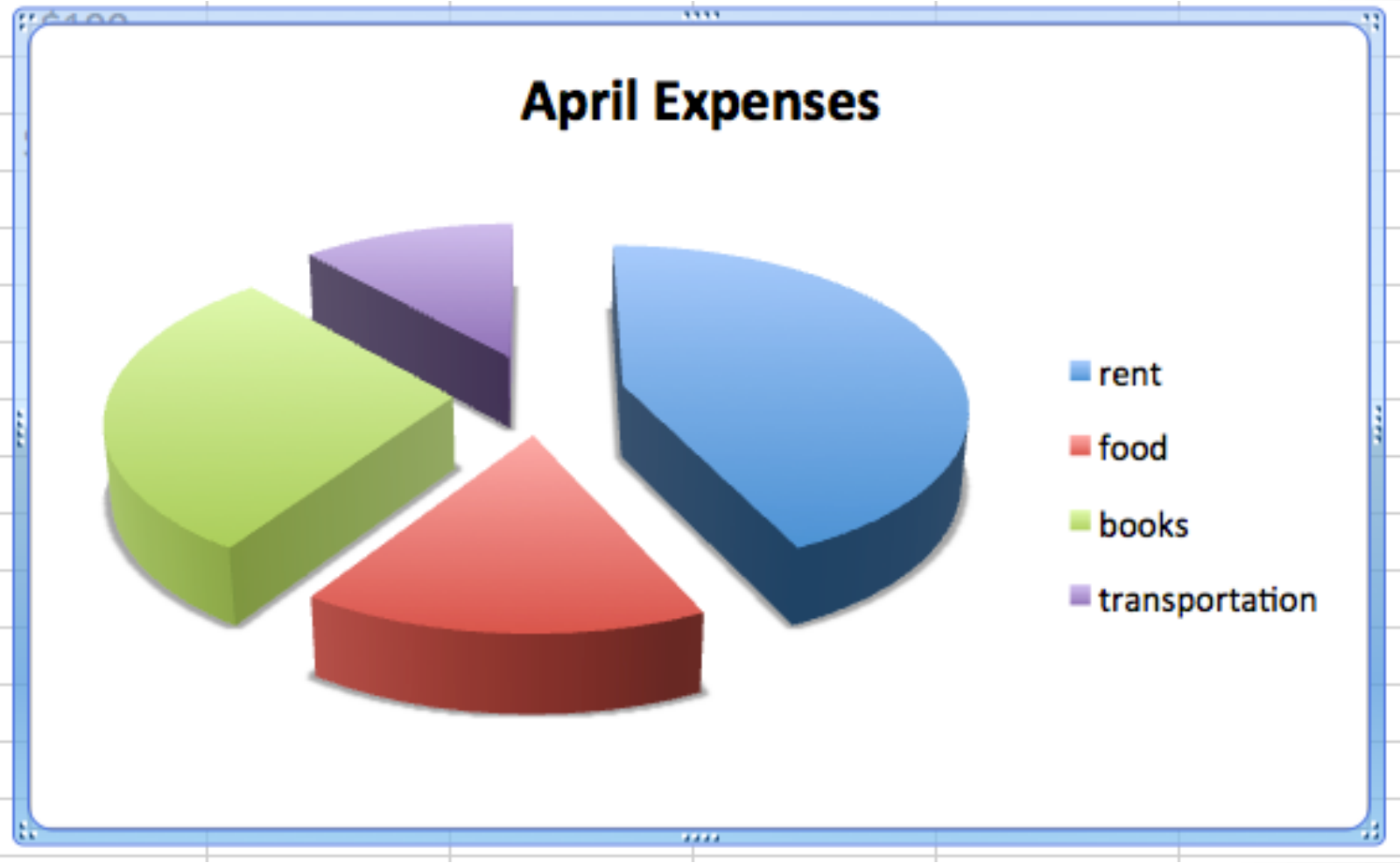
Choose your favorite type of pie chart . . .



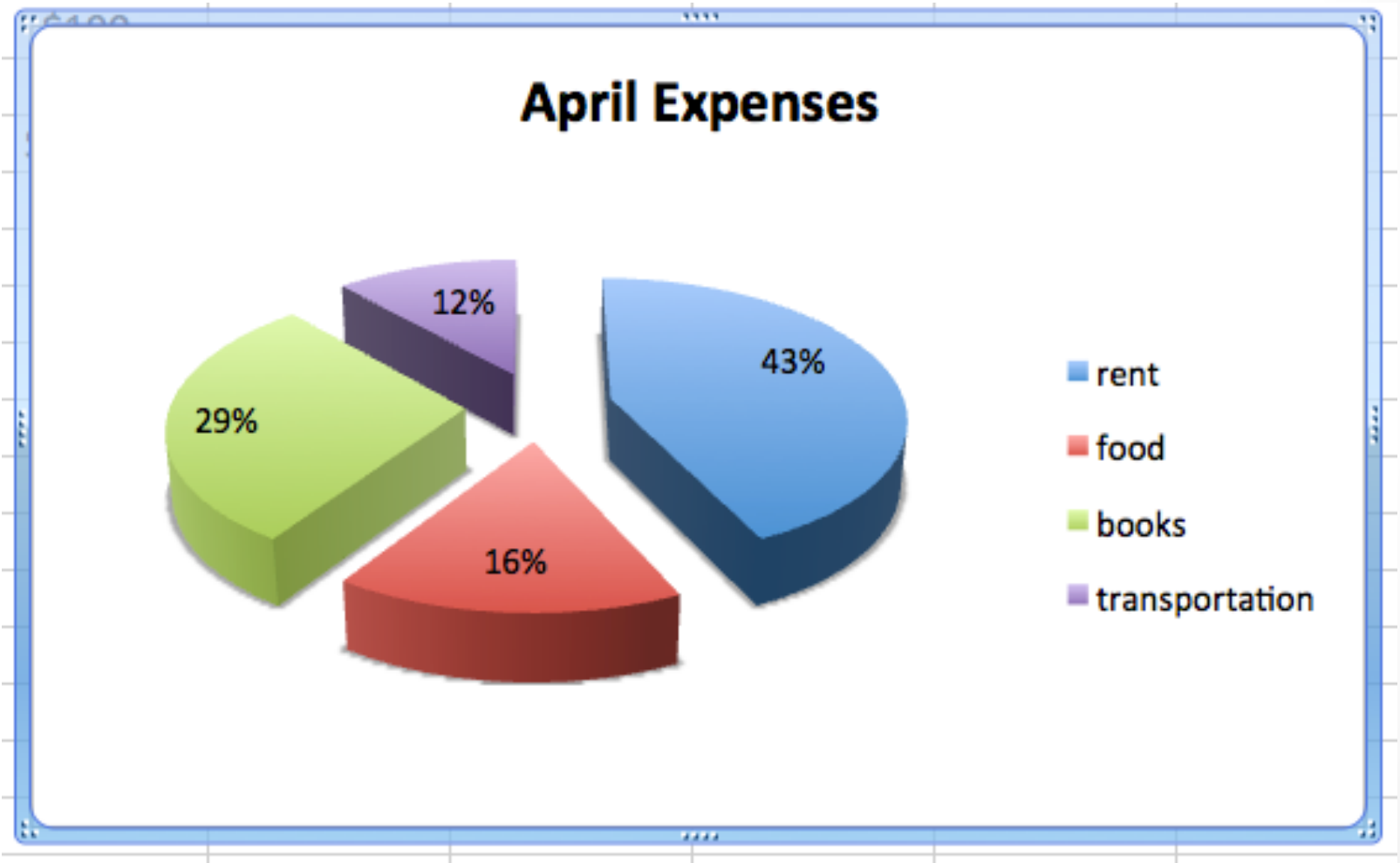
Ta Dah!!



Modify the title a little . . .



Even add percents



Revert to “live” Excel . . .

I may switch to “live” Excel, and demonstrate some additional items, such as creating a column chart, as well as how to create formulas to calculate percent change, and perhaps some other things.