

Requirements for Seminar

- Applications
 - Excel
- GradQuant Resources
 - <http://gradquant.ucr.edu/workshop-resources/>
- Audience
 - No Excel Experience Necessary

Mathematical Tools in Excel

Presented by GradQuant
Steven Jacobs

Acknowledgements

- Go! With Microsoft (Pearson)
 - http://www.amazon.com/GO-Microsoft-Office-2010-2/dp/0135090903/ref=sr_1_2?ie=UTF8&qid=1446057144&sr=8-2&keywords=Go%21+with+microsoft

Introduction

- Excel is actually a very powerful tool
- Capable of Performing Advanced Statistics



Objectives

- Introduce Basic Elements of Excel
 - Work through 2 examples
 - Inventory Status
 - Population Growth

Auto-fill Tool

	K	L	M	N
	Jan	1	10	Monday
		2	15	
		3	20	

	K	L	M	N
	Jan	1	10	Monday
	Feb	2	15	Tuesday
	Mar	3	20	Wednesday
	Apr	4	25	Thursday
	May	5	30	Friday
	Jun	6	35	Saturday
	Jul	7	40	Sunday
	Aug	8	45	Monday
	Sep	9	50	Tuesday
	Oct	10	55	Wednesday

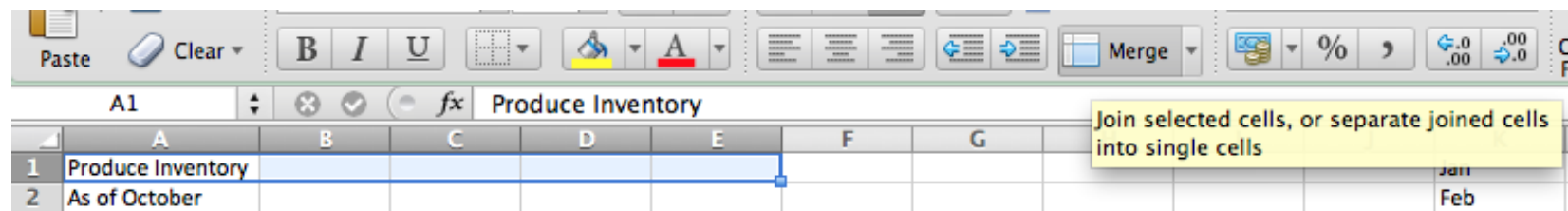
Part 1: Inventory Status

- Information that you collected on Produce
- Need to format nicely
- Need to collect statistics

Produce Inventory			
As of October			
Total In Stock			
Quantity In	Name	Price	Category
50	bananas	1.09	fruit
8	cabbage	0.85	vegetable
230	turnips	1.59	vegetable
200	apples	0.99	fruit
99	celery	0.42	vegetable
162	strawberries	2.53	fruit
45	edamame	1.66	vegetable
300	tomatoes	0.67	fruit
122	carrots	0.73	vegetable
76	blueberries	3.76	fruit
300	grapes	2.09	fruit
250	pears	1.23	fruit
123	peppers	0.97	fruit
42	asparagus	1.42	vegetable
156	peaches	0.98	fruit
210	nectarines	1.02	fruit
256	spinach	2.07	vegetable
73	avacados	0.52	fruit
42	lettuce	0.37	vegetable
500	blackberries	3.08	fruit

Simple Formatting

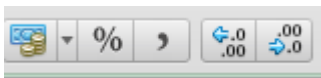
- Align Cells
- Merge Cells



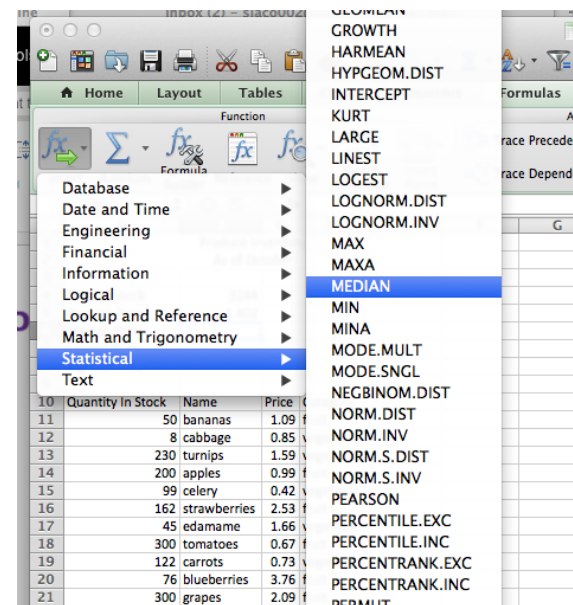
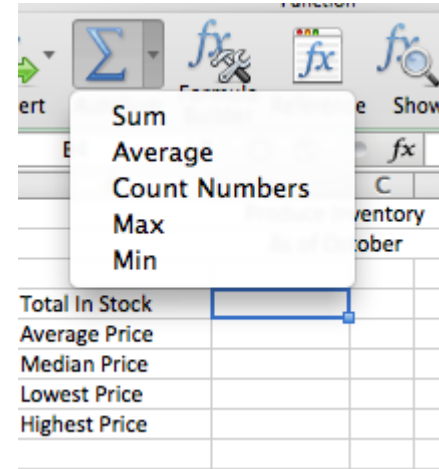
Produce Inventory			
As of October			
Total In Stock			
Quantity In Stock	Name	Price	Category
50	bananas	1.09	fruit
8	cabbage	0.85	vegetable
230	turnips	1.59	vegetable
200	apples	0.99	fruit
99	celery	0.42	vegetable
162	strawberries	2.53	fruit
45	edamame	1.66	vegetable
300	tomatoes	0.67	fruit
122	carrots	0.73	vegetable
76	blueberries	3.76	fruit
300	grapes	2.09	fruit
250	pears	1.23	fruit
123	peppers	0.97	fruit
42	asparagus	1.42	vegetable
156	peaches	0.98	fruit
210	nectarines	1.02	fruit
256	spinach	2.07	vegetable
73	avacados	0.52	fruit
42	lettuce	0.37	vegetable
500	blackberries	3.08	fruit

Simple Formulas

- Sum, Average, Median, Max, and Min
- AutoSum Option
- Select From Menu
- Formatting decimal and comma



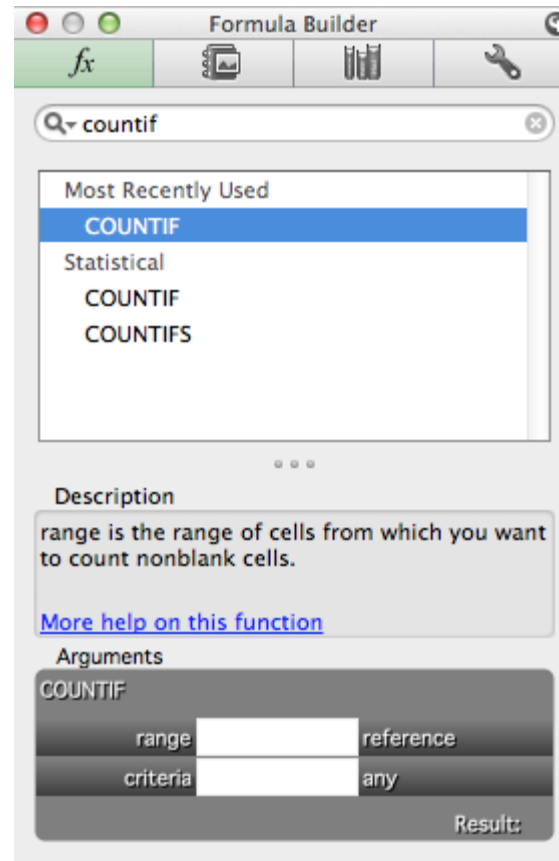
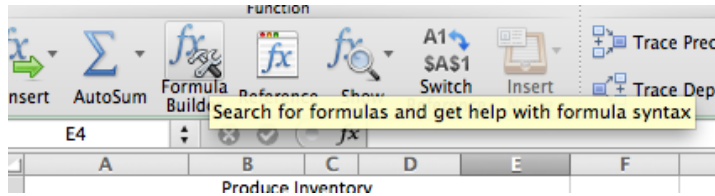
Total In Stock	3,244
Average Price	1.40
Median Price	1.06
Lowest Price	0.37
Highest Price	3.76



	A	B	C	D	E	F
1						
2						
3						
4	Total In Stock	=SUM(A11:A30)				
5	Average Price					
6	Median Price					
7	Lowest Price					
8	Highest Price					
9						
10	Quantity In Stock	Name	Price	Category		
11	50	bananas	1.09	fruit		
12	8	cabbage	0.85	vegetable		
13	230	turnips	1.59	vegetable		
14	200	apples	0.99	fruit		
15	99	celery	0.42	vegetable		
16	162	strawberries	2.53	fruit		
17	45	edamame	1.66	vegetable		
18	300	tomatoes	0.67	fruit		
19	122	carrots	0.73	vegetable		
20	76	blueberries	3.76	fruit		
21	300	grapes	2.09	fruit		
22	250	pears	1.23	fruit		
23	123	peppers	0.97	fruit		
24	42	asparagus	1.42	vegetable		
25	156	peaches	0.98	fruit		
26	210	nectarines	1.02	fruit		
27	256	spinach	2.07	vegetable		
28	73	avacados	0.52	fruit		
29	42	lettuce	0.37	vegetable		
30	500	blackberries	3.08	fruit		
31						

More Advanced Formulas

- Formula Builder
- COUNTIF

[illegible]

	Fruits	12
	Vegetables	8
ce	Category	
09	fruit	
85	vegetable	
59	vegetable	
99	fruit	
42	vegetable	
53	fruit	
66	vegetable	
67	fruit	
73	vegetable	
76	fruit	
09	fruit	
23	fruit	
97	fruit	
42	vegetable	
98	fruit	
02	fruit	
07	vegetable	
52	fruit	
37	vegetable	
08	fruit	

More Advanced Formulas

- Formula Builder
- IF
- Autofill with Formulas

The screenshot shows an Excel spreadsheet titled "Produce Inventory As of October". The table has columns: Quantity In Stock, Name, Price, Category, and Order?. The first few rows are highlighted. To the right, the "Formula Builder" window is open for the IF function. It shows the formula bar with "=IF(A11)" and a list of "Most Recently Used" functions including IF, COUNTIF, MAX, MIN, MEDIAN, AVERAGE, and SUM. The "Description" section explains that IF checks whether a condition is met and returns one value if TRUE, and another value if FALSE. The "Arguments" section shows "value1" as A11 and "TRUE" as the condition.

Quantity In Stock	Name	Price	Category	Order?
3,244	bananas	1.09	fruit	
8	cabbage	0.85	vegetable	
230	turnips	1.59	vegetable	
200	apples	0.99	fruit	
99	celery	0.42	vegetable	
162	strawberries	2.53	fruit	
45	edamame	1.66	vegetable	
300	tomatoes	0.67	fruit	
122	carrots	0.73	vegetable	
76	blueberries	3.76	fruit	
300	grapes	2.09	fruit	
250	pears	1.23	fruit	
123	peppers	0.97	fruit	
42	asparagus	1.42	vegetable	
156	peaches	0.98	fruit	
210	nectarines	1.02	fruit	
256	spinach	2.07	vegetable	
73	avacados	0.52	fruit	
42	lettuce	0.37	vegetable	
500	blackberries	3.08	fruit	

The screenshot shows the "Arguments" window for the IF function. It displays the following arguments:

Argument	Value
value1	A11
is < (Less Than)	
value2	75
then	"ORDER"
else	"OK"

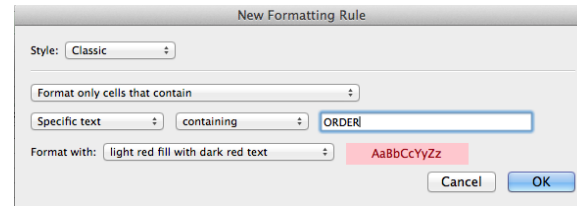
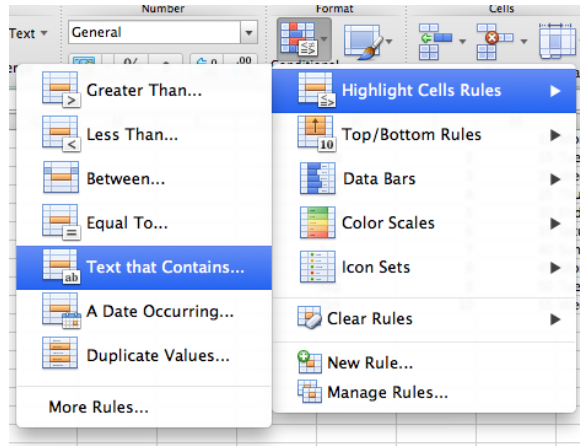
The "Result" is displayed as "ORDER".

Quantity In Stock	Name	Price	Category	Order?
50	bananas	1.09	fruit	ORDER
8	cabbage	0.85	vegetable	
230	turnips	1.59	vegetable	

Quantity In Stock	Name	Price	Category	Order?
50	bananas	1.09	fruit	ORDER
8	cabbage	0.85	vegetable	ORDER
230	turnips	1.59	vegetable	OK
200	apples	0.99	fruit	OK
99	celery	0.42	vegetable	OK
162	strawberries	2.53	fruit	OK
45	edamame	1.66	vegetable	ORDER
300	tomatoes	0.67	fruit	OK
122	carrots	0.73	vegetable	OK
76	blueberries	3.76	fruit	OK
300	grapes	2.09	fruit	OK
250	pears	1.23	fruit	OK
123	peppers	0.97	fruit	OK
42	asparagus	1.42	vegetable	ORDER
156	peaches	0.98	fruit	OK
210	nectarines	1.02	fruit	OK
256	spinach	2.07	vegetable	OK
73	avacados	0.52	fruit	ORDER
42	lettuce	0.37	vegetable	ORDER
500	blackberries	3.08	fruit	OK

Optional Cell Formatting

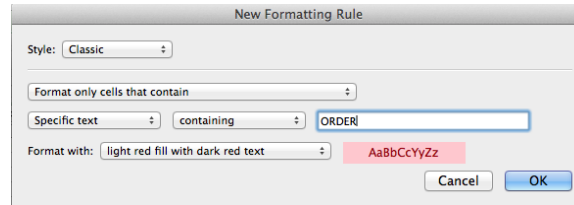
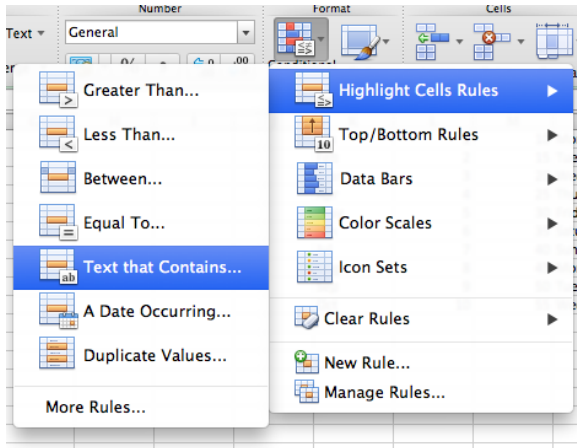
- Home->format
- Conditional Formatting



Item	Price	Category	Order?
bananas	1.09	fruit	ORDER
broccoli	0.85	vegetable	ORDER
carrots	1.59	vegetable	OK
celery	0.99	fruit	OK
corn	0.42	vegetable	OK
cranberries	2.53	fruit	OK
eggplant	1.66	vegetable	ORDER
potatoes	0.67	fruit	OK
spinach	0.73	vegetable	OK
strawberries	3.76	fruit	OK
tomatoes	2.09	fruit	OK
peas	1.23	fruit	OK
peppers	0.97	fruit	OK
peas	1.42	vegetable	ORDER
peaches	0.98	fruit	OK
strawberries	1.02	fruit	OK
broccoli	2.07	vegetable	OK
broccoli	0.52	fruit	ORDER
broccoli	0.37	vegetable	ORDER
broccoli	3.08	fruit	OK

Data Bars

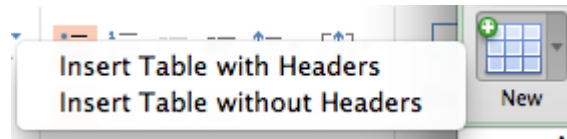
- Home->format
- Conditional Formatting



Item	Price	Category	Order?
bananas	1.09	fruit	ORDER
broccoli	0.85	vegetable	ORDER
carrots	1.59	vegetable	OK
celery	0.99	fruit	OK
corn	0.42	vegetable	OK
cranberries	2.53	fruit	OK
eggplant	1.66	vegetable	ORDER
potatoes	0.67	fruit	OK
spinach	0.73	vegetable	OK
strawberries	3.76	fruit	OK
tomatoes	2.09	fruit	OK
peas	1.23	fruit	OK
peppers	0.97	fruit	OK
peppercorns	1.42	vegetable	ORDER
peaches	0.98	fruit	OK
strawberries	1.02	fruit	OK
broccoli	2.07	vegetable	OK
broccoli	0.52	fruit	ORDER
broccoli	0.37	vegetable	ORDER
broccoli	3.08	fruit	OK

Excel Table

- Table->Insert table with Headers
- Now you have tools like sort and filter available



Quantity In Stock	Name	Price	Category	Order?
50	bananas	1.09	fruit	ORDER
8	cabbage	0.85	vegetable	ORDER
230	turnips	1.59	vegetable	OK
200	apples	0.99	fruit	OK
99	celery	0.42	vegetable	OK
162	strawberries	2.53	fruit	OK
45	edamame	1.66	vegetable	ORDER
300	tomatoes	0.67	fruit	OK
122	carrots	0.73	vegetable	OK
76	blueberries	3.76	fruit	OK
300	grapes	2.09	fruit	OK
250	pears	1.23	fruit	OK
123	peppers	0.97	fruit	OK
42	asparagus	1.42	vegetable	ORDER
156	peaches	0.98	fruit	OK
210	nectarines	1.02	fruit	OK
256	spinach	2.07	vegetable	OK
73	avacados	0.52	fruit	ORDER
42	lettuce	0.37	vegetable	ORDER
500	blackberries	3.08	fruit	OK

Sorting

- Click on the arrow next to the title of the column

Quantity In Stock	Name	Price	Category	Order?
42	lettuce	0.37	vegetable	ORDER
99	celery	0.42	vegetable	OK
73	avacados	0.52	fruit	ORDER
300	tomatoes	0.67	fruit	OK
122	carrots	0.73	vegetable	OK
8	cabbage	0.85	vegetable	ORDER
123	peppers	0.97	fruit	OK
156	peaches	0.98	fruit	OK
200	apples	0.99	fruit	OK
210	nectarines	1.02	fruit	OK
50	bananas	1.09	fruit	ORDER
250	pears	1.23	fruit	OK
42	asparagus	1.42	vegetable	ORDER
230	turnips	1.59	vegetable	OK
45	edamame	1.66	vegetable	ORDER
256	spinach	2.07	vegetable	OK
300	grapes	2.09	fruit	OK
162	strawberries	2.53	fruit	OK
500	blackberries	3.08	fruit	OK
76	blueberries	3.76	fruit	OK

Sort

By color: None

Filter

By color: None

Choose One

Search

☒ (Select All)

☒ 0.37

☒ 0.42

☒ 0.52

Clear Filter

Quantity In Stock	Name	Price	Category	Order?
42	lettuce	0.37	vegetable	ORDER
99	celery	0.42	vegetable	OK
73	avacados	0.52	fruit	ORDER
300	tomatoes	0.67	fruit	OK
122	carrots	0.73	vegetable	OK
8	cabbage	0.85	vegetable	ORDER
123	peppers	0.97	fruit	OK
156	peaches	0.98	fruit	OK
200	apples	0.99	fruit	OK
210	nectarines	1.02	fruit	OK
50	bananas	1.09	fruit	ORDER
250	pears	1.23	fruit	OK
42	asparagus	1.42	vegetable	ORDER
230	turnips	1.59	vegetable	OK
45	edamame	1.66	vegetable	ORDER
256	spinach	2.07	vegetable	OK
300	grapes	2.09	fruit	OK
162	strawberries	2.53	fruit	OK
500	blackberries	3.08	fruit	OK
76	blueberries	3.76	fruit	OK

Filtering

- Click on the arrow next to the title of the column
- Two Options

Quantity In Stock	Name	Price	Category	Order?
73	avacados	0.52	fruit	
300	tomatoes	0.67	fruit	
123	peppers	0.97	fruit	
156	peaches	0.98	fruit	
200	apples	0.99	fruit	
210	nectarines	1.02	fruit	
50	bananas	1.09	fruit	
250	pears	1.23	fruit	
300	grapes	2.09	fruit	
162	strawberries	2.53	fruit	
500	blackberries	3.08	fruit	
76	blueberries	3.76	fruit	

Category

Sort

By color: None

Filter

By color: None

Equals fruit

Choose One

Search

(Select All)

fruit

vegetable

Clear Filter

(Select All)

fruit

vegetable

Quantity In Stock	Name	Price	Category	Order?
73	avacados	0.52	fruit	ORDER
300	tomatoes	0.67	fruit	OK
123	peppers	0.97	fruit	OK
156	peaches	0.98	fruit	OK
200	apples	0.99	fruit	OK
210	nectarines	1.02	fruit	OK
50	bananas	1.09	fruit	ORDER
250	pears	1.23	fruit	OK
300	grapes	2.09	fruit	OK
162	strawberries	2.53	fruit	OK
500	blackberries	3.08	fruit	OK
76	blueberries	3.76	fruit	OK

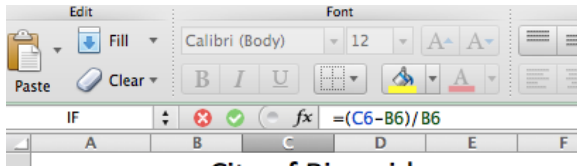
Part 2: Population Growth

- Take some simple data in Excel and plot population growth
- Extrapolate projected future growth

City of Riverside					
Population 1970 to 2010					
Year	1970	1980			
Population	115,241	118,072	123,591	133,936	152,126

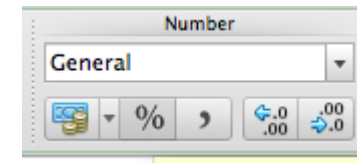
Writing a Formula By Hand

- Edit Text Box with "="
- Change to Percentage
- Note: Autofill copies name AND formatting



Year	1970	1980
Population	115,241	118,072
Percent Growth		$= (C6 - B6) / B6$

Year	1970	1980
Population	115,241	118,072
Percent Growth		0.02456591



Year	1970	1980	1980	1980	1980
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%			

City of Riverside					
Population 1970 to 2010					
Year	1970	1980	1980	1980	1980
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%

Growth Rate Table

- Create a second table to project growth

City of Riverside					
Population 1970 to 2010					
Year	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%
Projected Growth					
Estimated Growth Rate	<input type="text"/>				
Year	2010	2020	2030	2040	2050
Percentage					

Show Projections based on Estimated Rate

- Why does autofill fail?
- Format as absolute

City of Riverside					
Population 1970 to 2010					
Year	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%
Projected Growth					
Estimated Growth Rate	8%				
Year	2010	2020	2030	2040	2050
Percentage	152,126	=B14*(100%+B11)			

Projected Growth					
Estimated Growth Rate	8%				
Year	2010	2020	2030	2040	2050
Percentage	152,126	164,296	164,296	164,296	164,296

=B14*(100%+\$B\$11)

City of Riverside					
Population 1970 to 2010					
Year	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%
Projected Growth					
Estimated Growth Rate	8%				
Year	2010	2020	2030	2040	2050
Percentage	152,126	164,296	177,440	191,635	206,966

Changing Growth Estimation

- Project Growth Based on new percentage

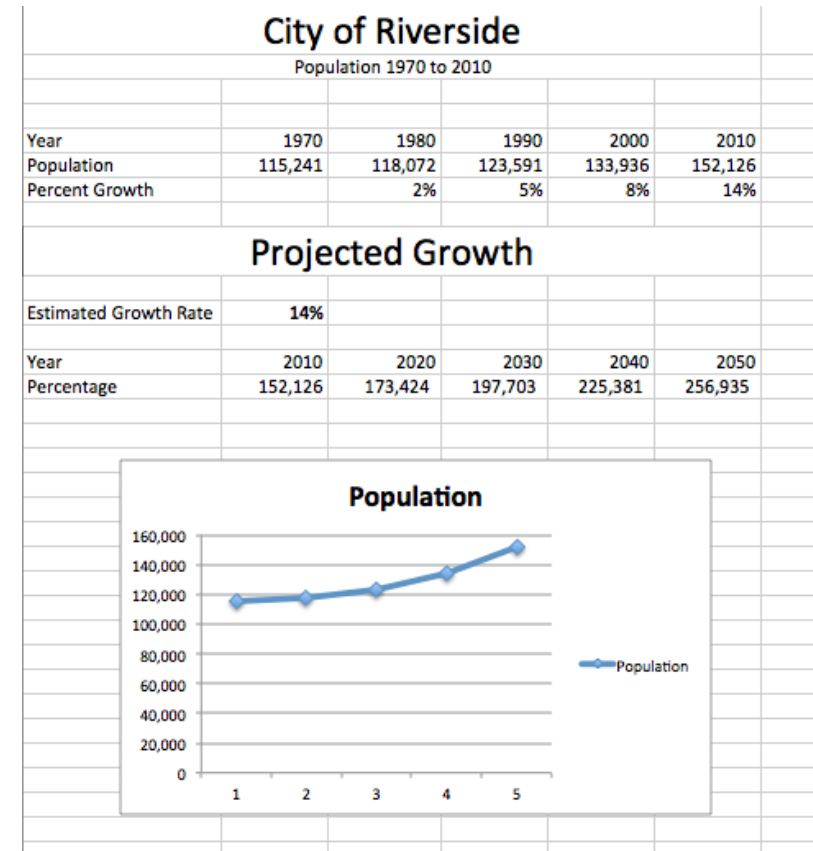
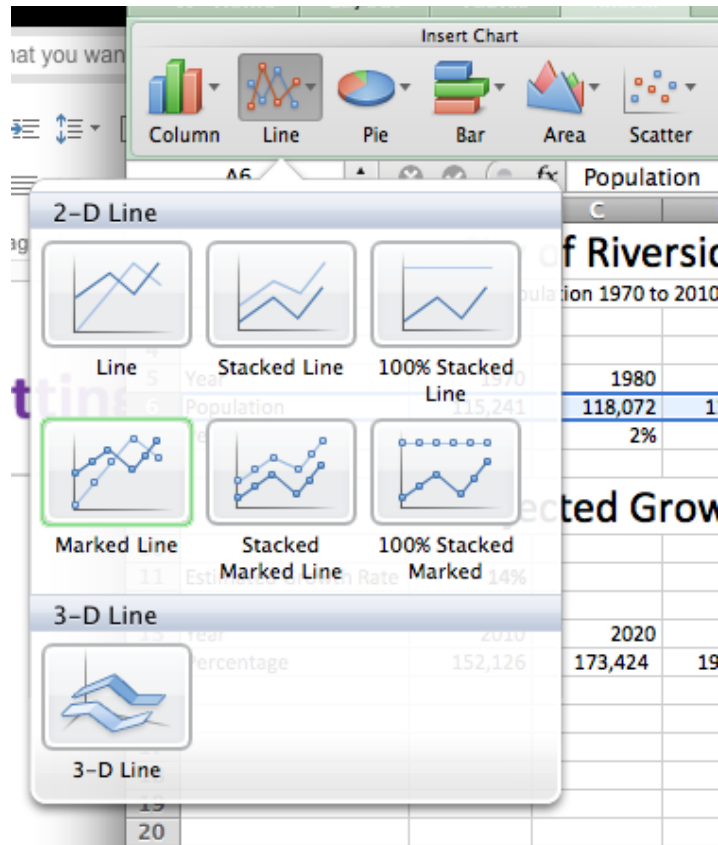
City of Riverside					
Population 1970 to 2010					
Year	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%
Projected Growth					
Estimated Growth Rate	14%				
Year	2010	2020	2030	2040	2050
Percentage	152,126	173,424	197,703	225,381	256,935

Plotting data

- Insert a plot line
- Charts

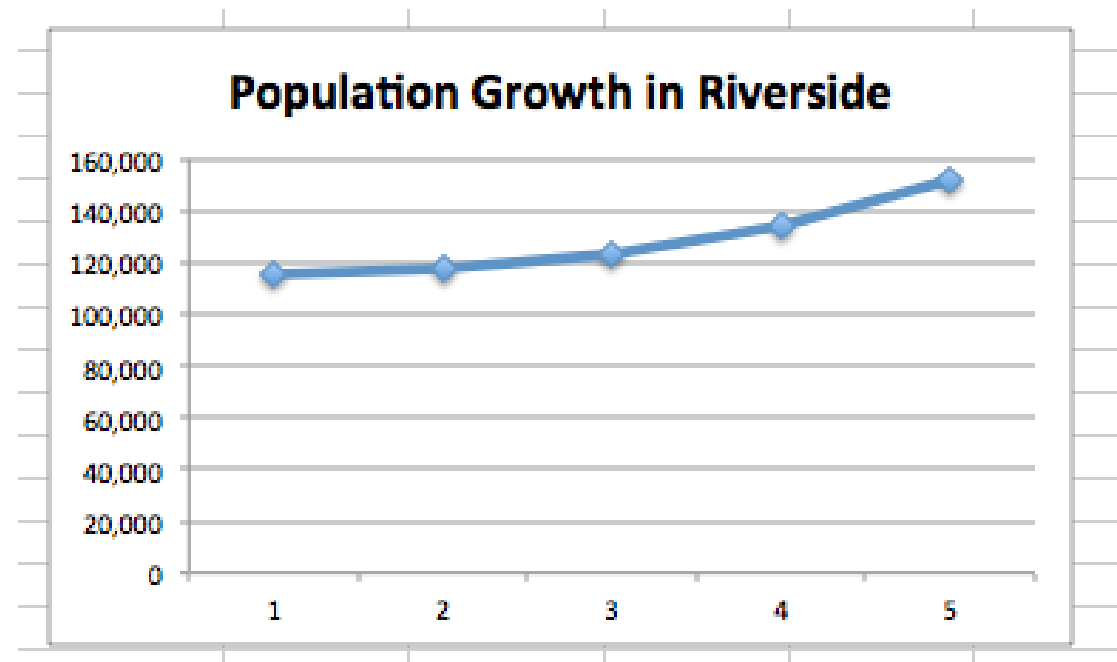
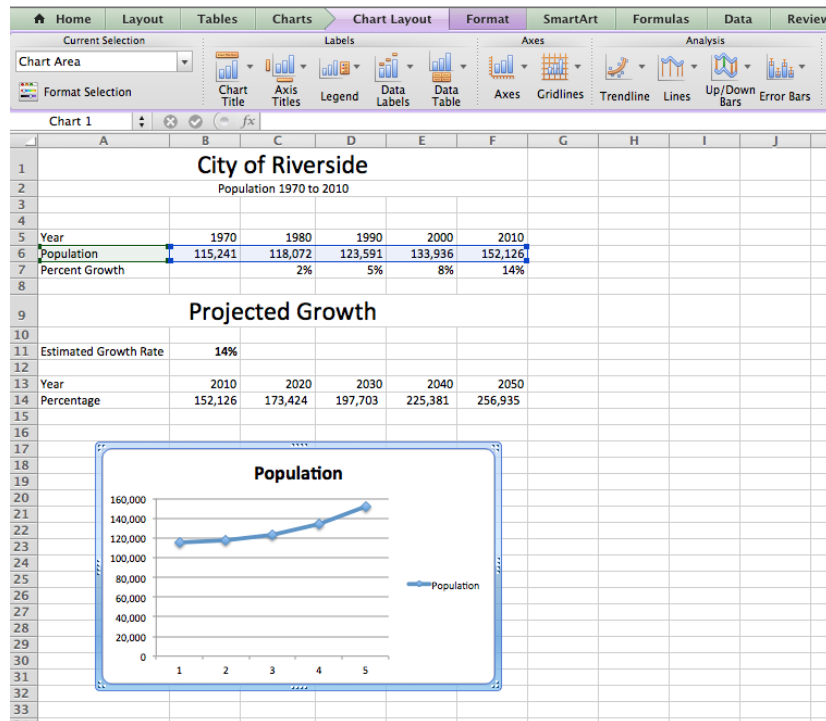
Population 1970 to 2010					
Year	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%

Projected Growth



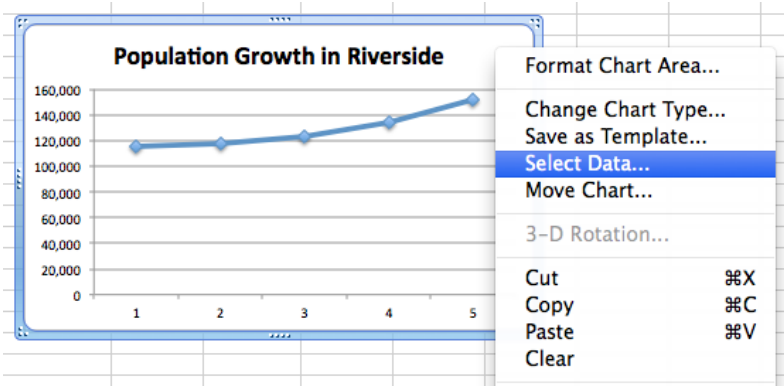
Formatting Charts

- Chart Layout Tools
- Remove Legend
- Change Title



Formatting Charts

- Axis Labels



	1970	1980	1990	2000	2010
Population	115,241	118,072	123,591	133,936	152,126
Percent Growth		2%	5%	8%	14%

Select Data Source

Chart data range:

Switch Row/Column

Series: Population

Name:

Y values:

Add Remove

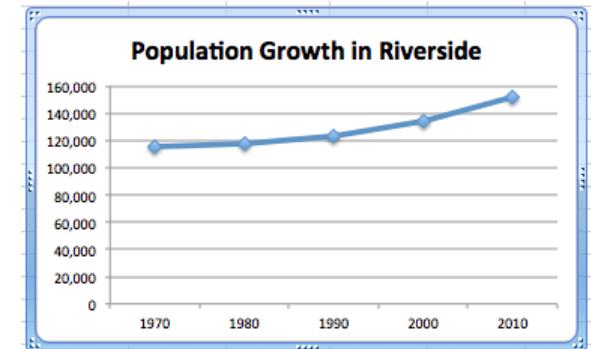
Category (X) axis labels:

Hidden and Empty Cells

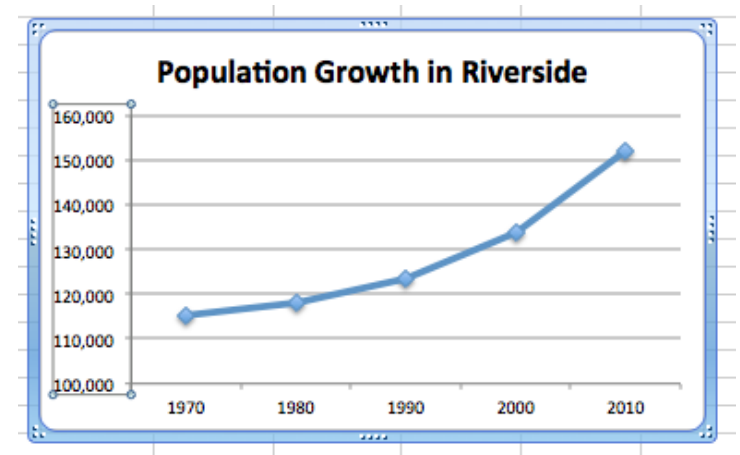
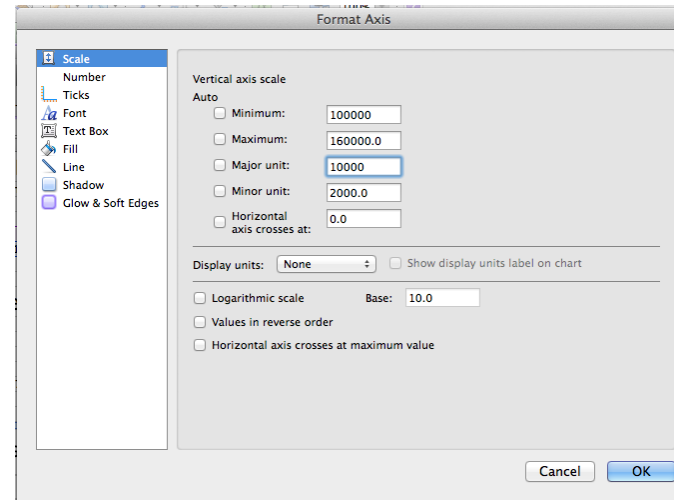
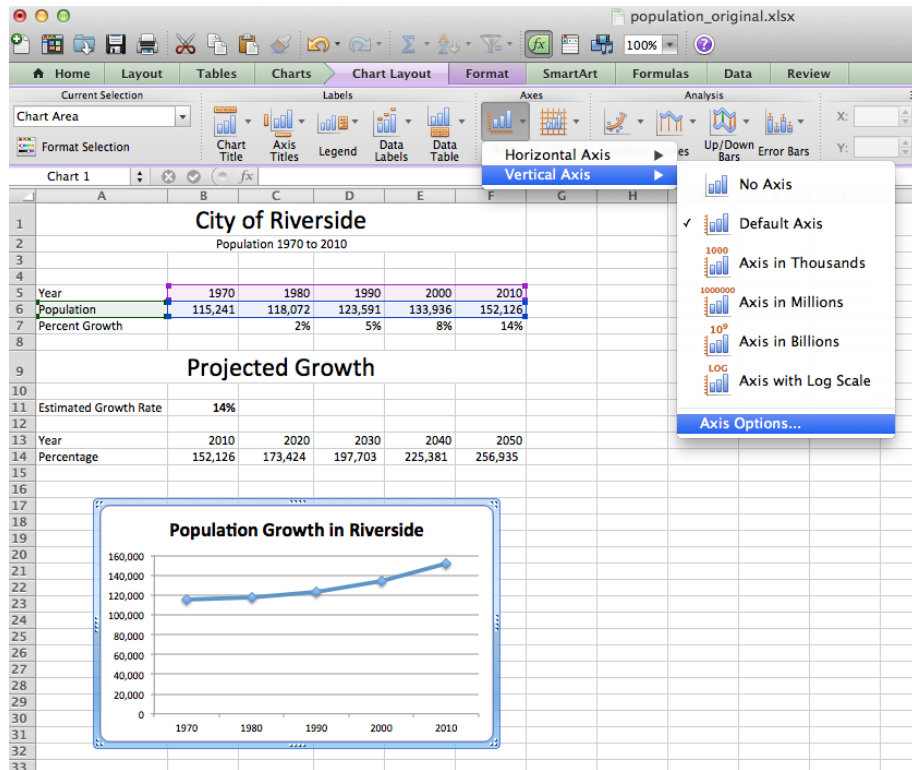
Show empty cells as:

☐ Show data in hidden rows and columns

Cancel OK



Removing Unused Range



GradQuant

- One-on-one Consultations
 - Make appointment on the website
 - <http://gradquant.ucr.edu>
- More Seminars on Programming
 - Python Fundamentals (Offered Fall)
 - Data Manipulation with Python (Offered Winter)
 - Advanced Python (Offered Spring)
 - Java Fundamentals (Offered this quarter)
 - <http://gradquant.ucr.edu/workshop-resources/>

Remember to fill out the seminar survey. Thank you!