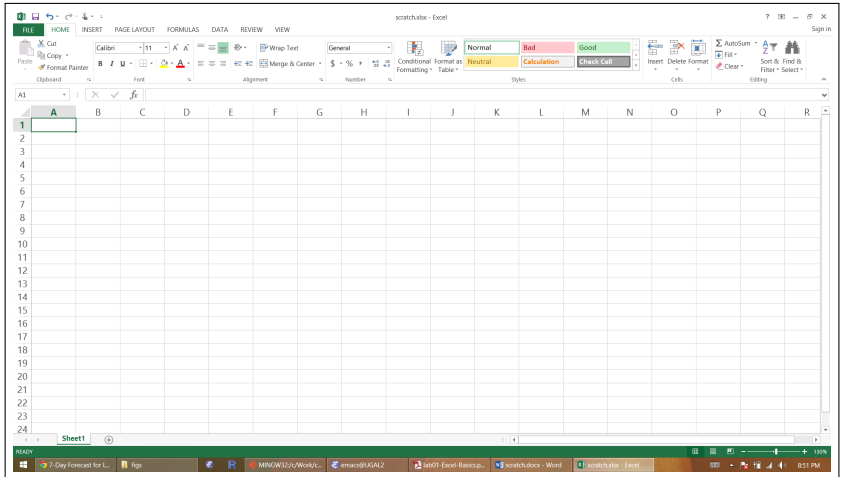
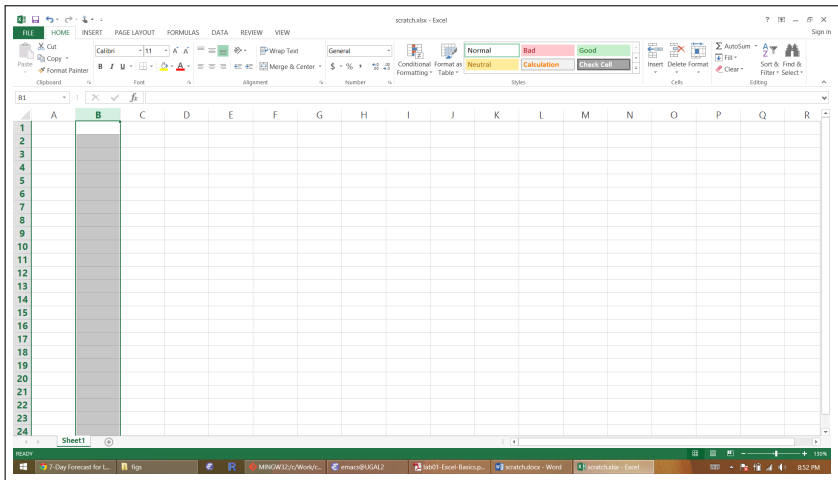


Applied Population Dynamics

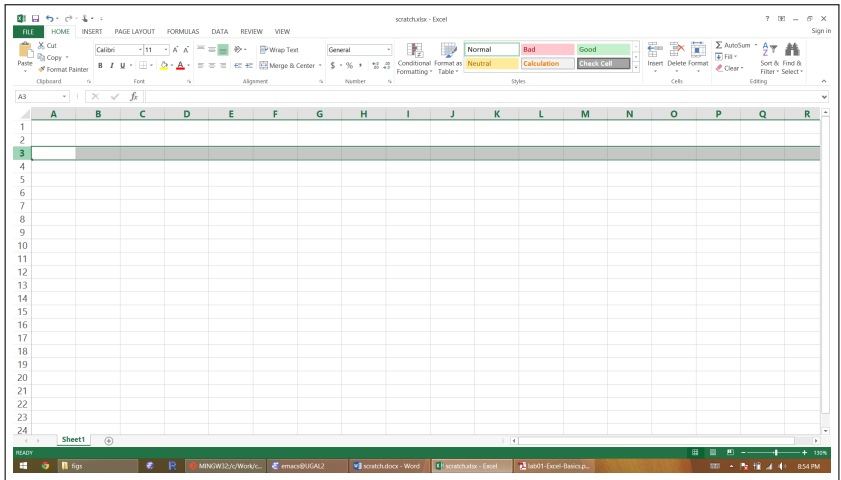
Lab 1 – Excel and R Basics



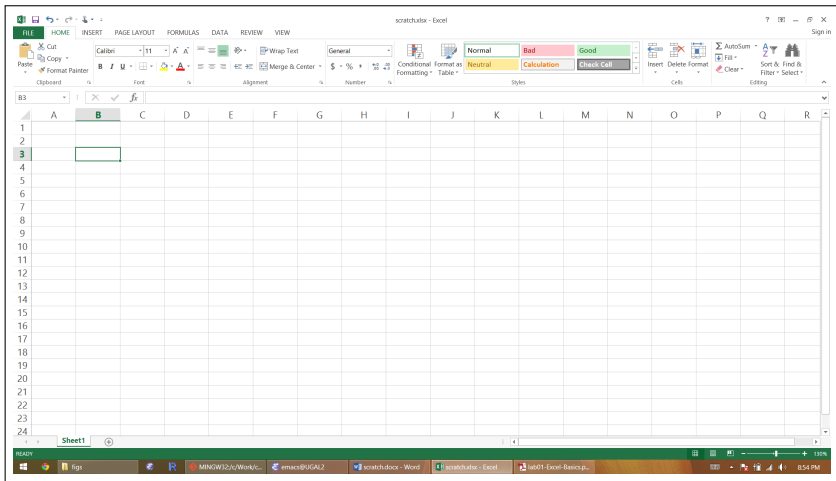
COLUMN B



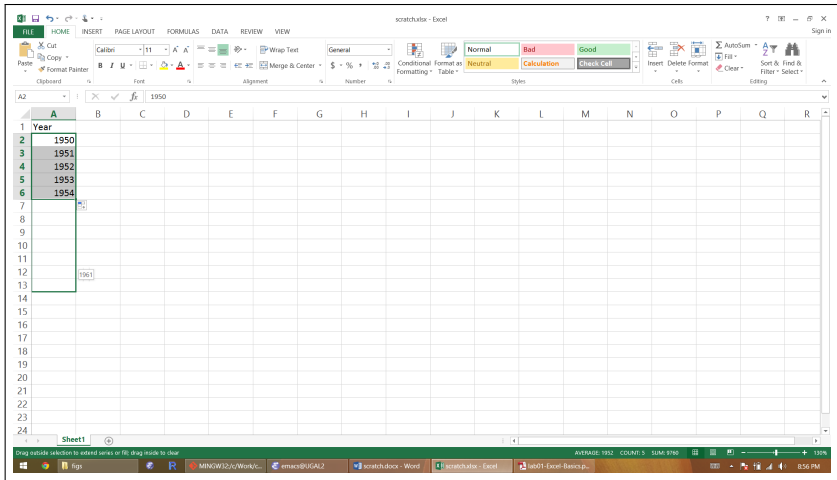
Row 3



CELL B3



CREATE SEQUENCE USING AUTO-FILL



To use auto-fill: begin a sequence, highlight the cells, and then drag the box at the bottom-right of the last cell.

RELATIVE CELL REFERENCES

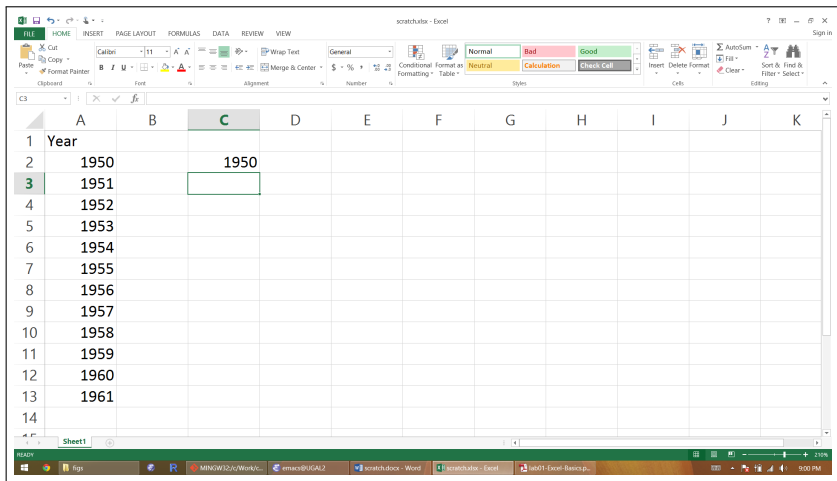
The screenshot shows the Microsoft Excel interface with the following details:

- File Name:** scratch.xlsx - Excel
- Formulas Bar:** Displays the formula `=A2` in cell C2.
- Worksheet:** Sheet1
- Grid Data:**

	A	B	C	D	E	F	G	H	I	J	K
1	Year										
2	1950		=A2								
3	1951										
4	1952										
5	1953										
6	1954										
7	1955										
8	1956										
9	1957										
10	1958										
11	1959										
12	1960										
13	1961										
14											

Cell C2 will take on the value of A2

RELATIVE CELL REFERENCES



Cell C2 will take on the value of A2

RELATIVE CELL REFERENCES

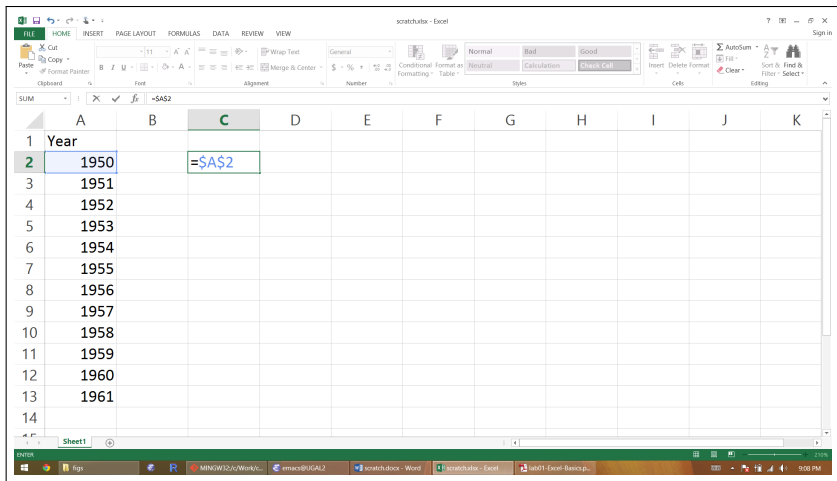
The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K
1	Year										
2	1950		1950								
3	1951		1951								
4	1952		1952								
5	1953		1953								
6	1954		1954								
7	1955		1955								
8	1956		1956								
9	1957		1957								
10	1958		1958								
11	1959		1959								
12	1960		1960								
13	1961		1961								
14											

The formula bar shows the active cell C13 contains the formula `=A13`. The taskbar at the bottom shows the following open applications: fgs, MINGW32/L/Work/c..., emacs@UGA2, scratch.docx - Word, scratch.xlsx - Excel, and lab01-Excel-Basics.p...

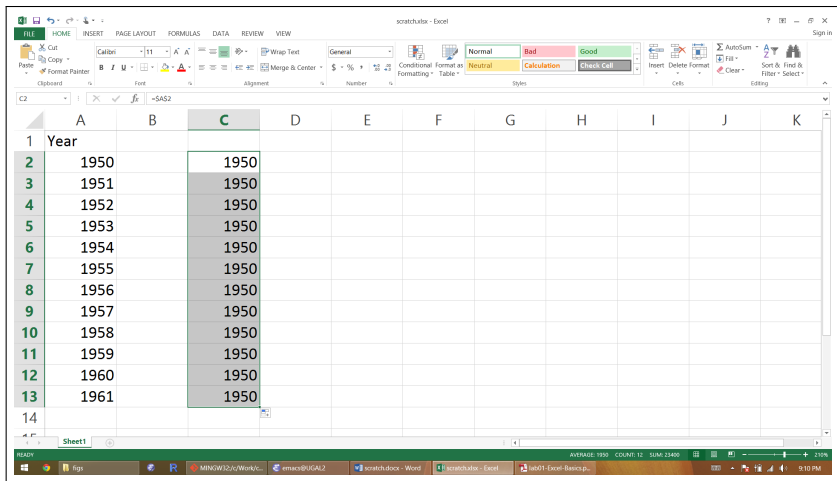
Values of reference will change when using auto-fill

ABSOLUTE CELL REFERENCES



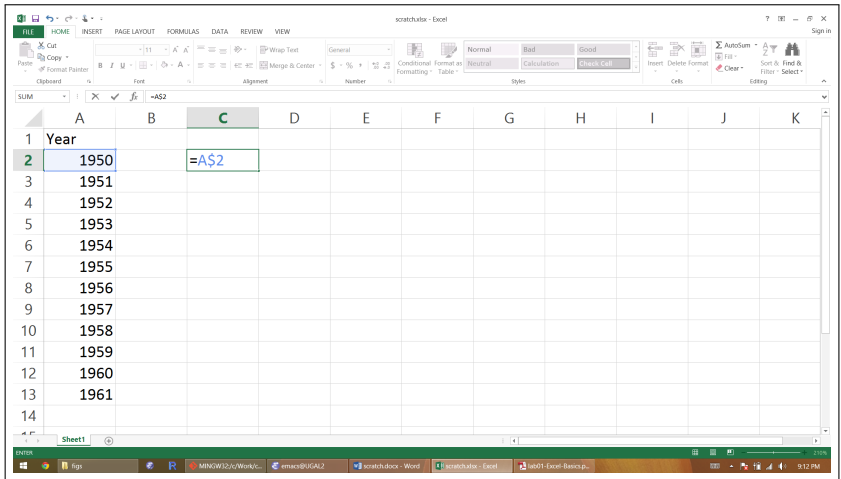
Dollar sign “locks” a reference so that auto-fill won’t change it

ABSOLUTE CELL REFERENCES



Dollar sign “locks” a reference so that auto-fill won’t change it

PARTIAL CELL REFERENCES



EQUATIONS

The screenshot shows the Microsoft Excel interface with the following details:

- File Name:** scratch.xlsx - Excel
- Formulas Bar:** Displays the formula $=B2 + B2*0.01$.
- Spreadsheet Data:**

	A	B	C	D	E	F	G	H	I	J	K
1	Year	Females									
2	1950	100									
3	1951	$=B2 + B2*0.01$									
4	1952										
5	1953										
6	1954										
7	1955										
8	1956										
9	1957										
10	1958										
11	1959										
12	1960										
13	1961										
14											
- Taskbar:** Shows the taskbar with the following open applications: Edge, File Explorer, Word, Excel, and a presentation file named '1st01-Excel-Basics.ppt'.

EQUATIONS

scratch.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Calibri 11 A A

B I U

General

Conditional Formatting Table

Normal Bad Good Neutral Calculation Check Cell

Insert Delete Format

Autosum

Sort & Find & Filter Select

B3 =B2 + B2*0.01

	A	B	C	D	E	F	G	H	I	J	K
1	Year	Females									
2	1950	100									
3	1951	101									
4	1952	102.01									
5	1953	103.03									
6	1954	104.06									
7	1955	105.101									
8	1956	106.152									
9	1957	107.214									
10	1958	108.286									
11	1959	109.369									
12	1960	110.462									
13	1961	111.567									
14											

Sheet1

READY AVERAGE: 106.2047228 COUNT: 11 SUM: 1168.250901

MINGW32\c\Workc... emacs@UGA2 scratch.docx - Word scratch.xlsx - Excel ie01-Excel-Basics.p...

9:16 PM

EQUATIONS

scratch.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Clipboard Font Alignment Number Styles Cells

B2 =B2*0.8

	A	B	C	D	E	F	G	H	I	J	K
1	Year	Females	Males								
2	1950	100	=B2*0.8								
3	1951	101									
4	1952	102.01									
5	1953	103.03									
6	1954	104.06									
7	1955	105.101									
8	1956	106.152									
9	1957	107.214									
10	1958	108.286									
11	1959	109.369									
12	1960	110.462									
13	1961	111.567									
14											

Sheet1

ENTER

Windows taskbar: figs, MINGW32/c/Workc..., emacs@UGA2, scratchdock - Word, scratchdock - Excel, lab01-Excel-Basics.p...

9:18 PM

scratch.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Clipboard Font Alignment Number Conditional Formatting Styles Cells Editing

Normal Bad Good Neutral Calculation Check Cell

AutoSum Fill Clear Sort & Find & Filter Select

C2: $=B2*0.8$

	A	B	C	D	E	F	G	H	I	J	K
1	Year	Females	Males								
2	1950	100	80								
3	1951	101	80.8								
4	1952	102.01	81.608								
5	1953	103.03	82.4241								
6	1954	104.06	83.2483								
7	1955	105.101	84.0808								
8	1956	106.152	84.9216								
9	1957	107.214	85.7708								
10	1958	108.286	86.6285								
11	1959	109.369	87.4948								
12	1960	110.462	88.3698								
13	1961	111.567	89.2535								
14											

Sheet1

READY AVERAGE: 84.35002009 COUNT: 12 SUM: 1014.600241 210%

figs R MINGW32/x/Workc... emacs@UGA2 scratch.docx - Word scratch.xlsx - Excel ied01-Excel-Basics.p...

5:19 PM

FORMULAS

scratch.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation Check Cell

AutoSum Sort & Find & Filter Select Clear

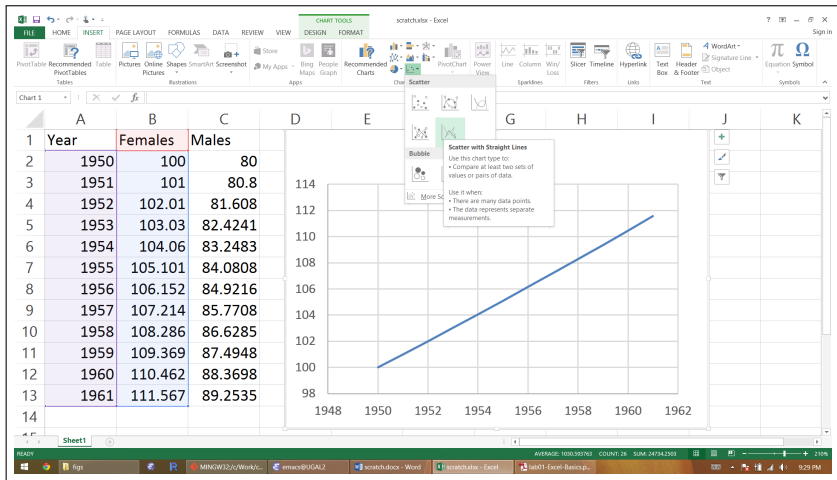
SUM X fx =ROUND(C4, 3)

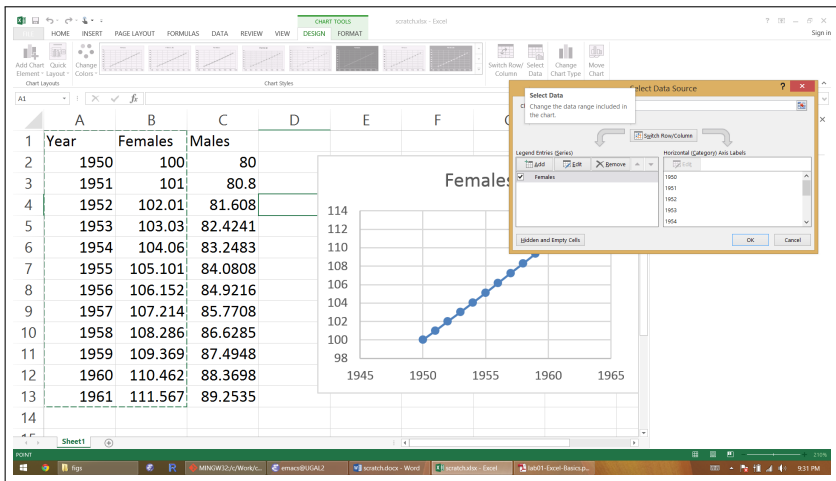
	A	B	C	D	E	F	G	H	I	J	K
1	Year	Females	Males								
2	1950	100	80								
3	1951	101	80.8								
4	1952	102.01	81.608	=ROUND(C4, 3)							
5	1953	103.03	82.4241								
6	1954	104.06	83.2483								
7	1955	105.101	84.0808								
8	1956	106.152	84.9216								
9	1957	107.214	85.7708								
10	1958	108.286	86.6285								
11	1959	109.369	87.4948								
12	1960	110.462	88.3698								
13	1961	111.567	89.2535								
14											

Sheet1

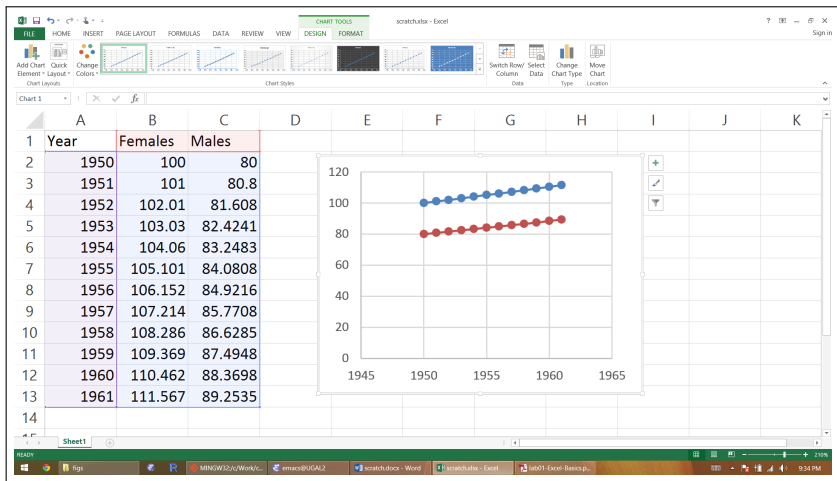
100%

9:21 PM

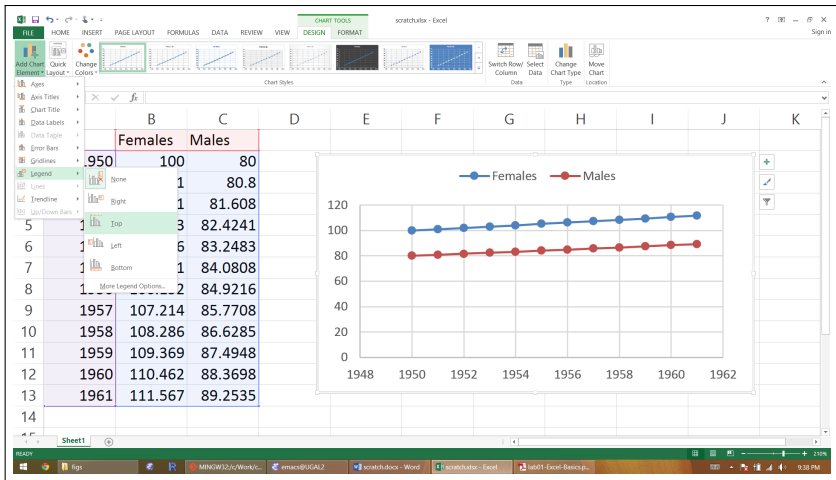




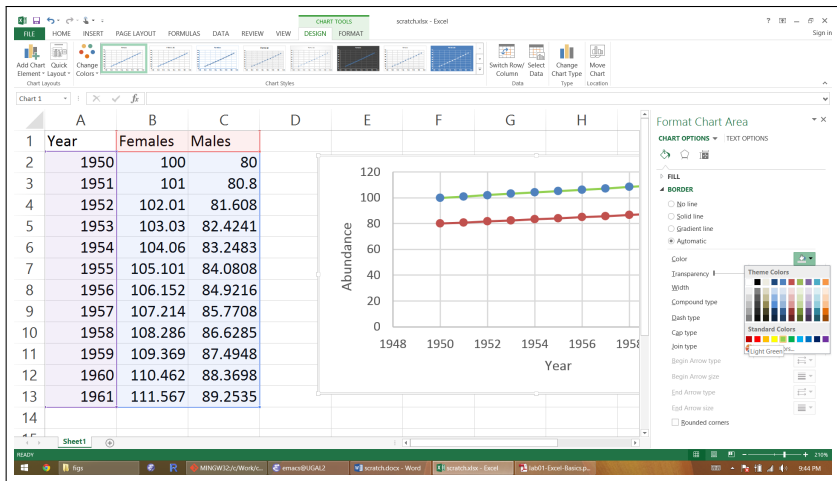
Add a line for males



Add a line for males



Add legend



Change line color

R can be downloaded here: <https://www.r-project.org/>

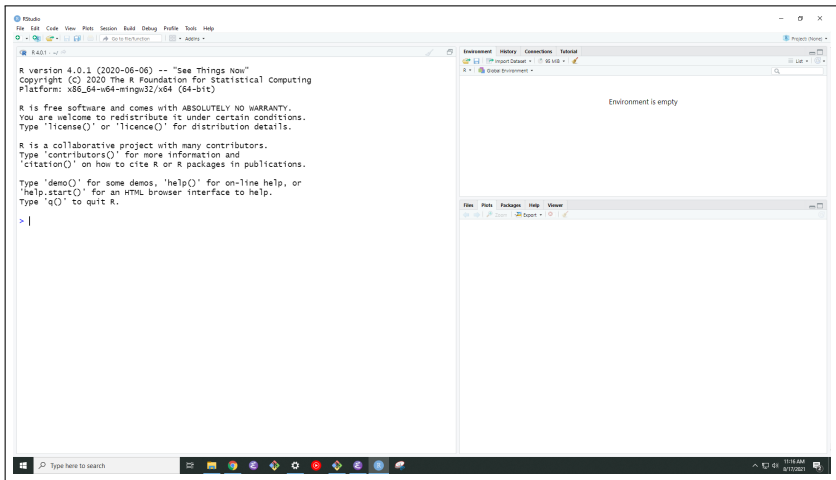
R can be downloaded here: <https://www.r-project.org/>

You can use the graphical user interface that comes with **R**, or you can run **R** through a system like **ESS+emacs** (<https://vgoulet.act.ulaval.ca/en/home/>) or **RStudio** (<https://www.rstudio.com/>)

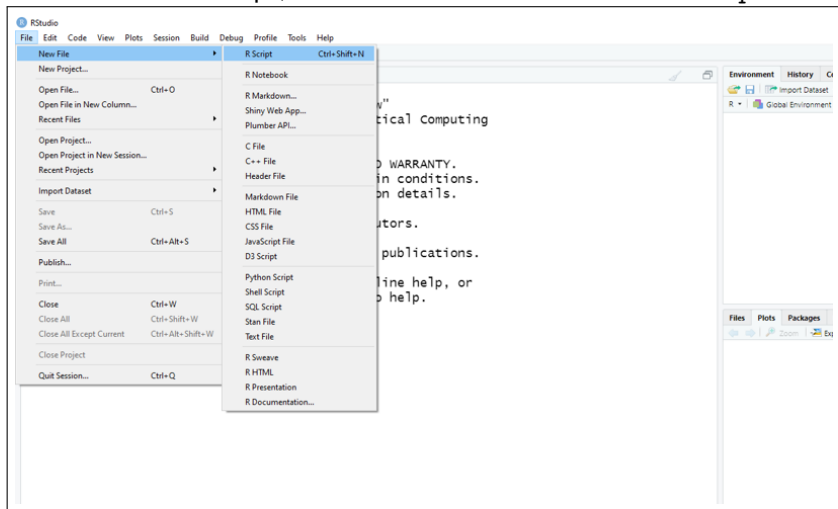
R can be downloaded here: <https://www.r-project.org/>

You can use the graphical user interface that comes with **R**, or you can run **R** through a system like **ESS+emacs** (<https://vgoulet.act.ulaval.ca/en/home/>) or **RStudio** (<https://www.rstudio.com/>)

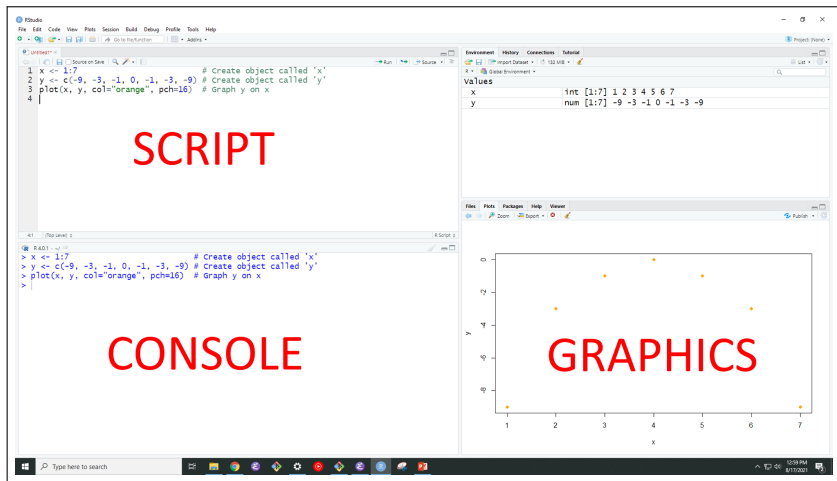
Most people use **RStudio** these days



To create a new script, click: File > New File > R Script



Save your script using: File > Save As



Create an object called `year` to hold the sequence of years.

```
year <- 1950:1961 # A vector of integers
year           # Type the name of an object to see its values

## [1] 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961
```

Create an object called `year` to hold the sequence of years.

```
year <- 1950:1961 # A vector of integers
year           # Type the name of an object to see its values

## [1] 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961
```

Use the `length` function to determine the number of values in a vector.

```
nYears <- length(year)
nYears

## [1] 12
```

A SIMPLE POPULATION MODEL

Create an empty vector to store the data on females. Set female abundance to 100 in the first year.

```
females <- rep(NA, nYears)
females[1] <- 100
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for(t in 2:nYears) {
  females[t] <- females[t-1] + females[t-1]*0.01
}
```


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}
```

We will use “for loops” for almost every population model that we implement in R

Generate the data on males
using a single line of code.

```
males <- females*0.8
```

A SIMPLE POPULATION MODEL

Put the objects in a `data.frame`

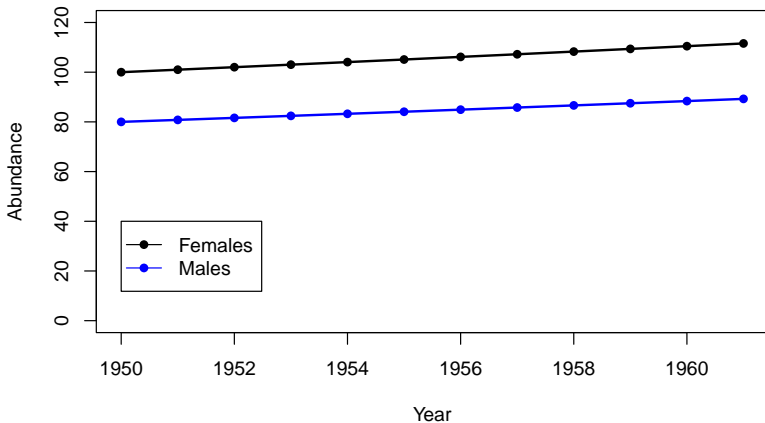
Generate the data on males
using a single line of code.

```
males <- females*0.8
```

```
model1 <- data.frame(year, females, males)
model1
```

##	year	females	males
## 1	1950	100.0000	80.00000
## 2	1951	101.0000	80.80000
## 3	1952	102.0100	81.60800
## 4	1953	103.0301	82.42408
## 5	1954	104.0604	83.24832
## 6	1955	105.1010	84.08080
## 7	1956	106.1520	84.92161
## 8	1957	107.2135	85.77083
## 9	1958	108.2857	86.62854
## 10	1959	109.3685	87.49482
## 11	1960	110.4622	88.36977
## 12	1961	111.5668	89.25347

```
plot(females ~ year, data=model1, type="o", xlab="Year", ylab="Abundance",  
     lwd=2, pch=16, ylim=c(0, 120))  
lines(males ~ year, data=model1, type="o", col="blue", lwd=2, pch=16)  
legend(x=1950, y=40, legend=c("Females", "Males"), col=c("black", "blue"), lty=1, pch=16)
```



1. Create an Excel file and name it “Yourlastname_Yourfirstname”.
2. Create the sheet shown on the next page using the techniques covered in this lab.
 - ▶ Use auto-fill to create the first two columns.
 - ▶ For the “Adults” column, use the equation shown for cells C3 through C22. Note: For cell C2, you can directly enter the value “10”.
3. Copy “Sheet1” to a new sheet and change the color and thickness of the lines. You can pick any colors and thicknesses you want.
4. Replicate steps 1–3 using a “for loop” in a self-contained R script.
5. Upload the Excel workbook (with both sheets) and the R script to ELC.

ASSIGNMENT

