

Introduction to R

Some of What Makes It Powerful and Cool

Chester Ismay, Instructional Technologist for Quantitative
Applications

September 11, 2015

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel
- ▶ Try to get chart/plot to look the way you want

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel
- ▶ Try to get chart/plot to look the way you want
- ▶ Copy figure into Word document

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel
- ▶ Try to get chart/plot to look the way you want
- ▶ Copy figure into Word document
- ▶ Identify key values from your analysis

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel
- ▶ Try to get chart/plot to look the way you want
- ▶ Copy figure into Word document
- ▶ Identify key values from your analysis
- ▶ Provide comments on trends in the plot

The traditional approach to lab reports

Excel and Word

- ▶ Enter values into Excel
- ▶ Try to get chart/plot to look the way you want
- ▶ Copy figure into Word document
- ▶ Identify key values from your analysis
- ▶ Provide comments on trends in the plot
- ▶ “Print off” and turn in

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis
- ▶ Make sure to not inadvertently change any Excel cell values

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis
- ▶ Make sure to not inadvertently change any Excel cell values
- ▶ Redo making of Excel figure(s) (often from scratch)

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis
- ▶ Make sure to not inadvertently change any Excel cell values
- ▶ Redo making of Excel figure(s) (often from scratch)
- ▶ Remember to copy new figure(s) into Word document

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis
- ▶ Make sure to not inadvertently change any Excel cell values
- ▶ Redo making of Excel figure(s) (often from scratch)
- ▶ Remember to copy new figure(s) into Word document
- ▶ Remember to update values in modified Word document

The traditional approach to lab reports

What if you need to make modifications?

- ▶ Try to follow how you created formulas in Excel for analysis
- ▶ Make sure to not inadvertently change any Excel cell values
- ▶ Redo making of Excel figure(s) (often from scratch)
- ▶ Remember to copy new figure(s) into Word document
- ▶ Remember to update values in modified Word document
- ▶ **This process is often tedious and frustrating. *What if there was a better way?***

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with
 - ▶ data manipulation

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with
 - ▶ data manipulation
 - ▶ automation

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with
 - ▶ data manipulation
 - ▶ automation
 - ▶ reproducibility

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excels* in helping you with
 - ▶ data manipulation
 - ▶ automation
 - ▶ reproducibility
 - ▶ improved accuracy

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excels* in helping you with
 - ▶ data manipulation
 - ▶ automation
 - ▶ reproducibility
 - ▶ improved accuracy
 - ▶ error finding

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with
 - ▶ data manipulation
 - ▶ automation
 - ▶ reproducibility
 - ▶ improved accuracy
 - ▶ error finding
 - ▶ customizability

Use R!

What is R?

- ▶ R is a completely free software package and language for statistical analysis and graphics.
- ▶ It *excel/s* in helping you with
 - ▶ data manipulation
 - ▶ automation
 - ▶ reproducibility
 - ▶ improved accuracy
 - ▶ error finding
 - ▶ customizability
- ▶ Any downsides?

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.
- ▶ It is also completely free.

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.
- ▶ It is also completely free.
- ▶ You can write your entire paper/report (text, code, analysis, graphics, etc.) all in R Markdown.

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.
- ▶ It is also completely free.
- ▶ You can write your entire paper/report (text, code, analysis, graphics, etc.) all in R Markdown.
- ▶ If you need to update any of your code, R Markdown will automatically update your plots and output of your analysis and will create an updated PDF file.

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.
- ▶ It is also completely free.
- ▶ You can write your entire paper/report (text, code, analysis, graphics, etc.) all in R Markdown.
- ▶ If you need to update any of your code, R Markdown will automatically update your plots and output of your analysis and will create an updated PDF file.
- ▶ **No more copy-and-paste!**

Learning how to use R

RStudio, R Markdown, & me!

- ▶ RStudio is a powerful user interface that helps you get better control of your analysis.
- ▶ It is also completely free.
- ▶ You can write your entire paper/report (text, code, analysis, graphics, etc.) all in R Markdown.
- ▶ If you need to update any of your code, R Markdown will automatically update your plots and output of your analysis and will create an updated PDF file.
- ▶ **No more copy-and-paste!**
- ▶ My main responsibility in this position is to help members of the Reed community learn R and help them with their analysis and graphics.

What to do next?

Installation and help

- ▶ `http:`
`//reed.edu/data-at-reed/software/R/r_studio.html`

What to do next?

Installation and help

- ▶ `http:`
`//reed.edu/data-at-reed/software/R/r_studio.html`
- ▶ `http://reed.edu/data-at-reed/resources/`

What to do next?

Installation and help

- ▶ `http://reed.edu/data-at-reed/software/R/r_studio.html`
- ▶ `http://reed.edu/data-at-reed/resources/`
- ▶ `https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf`

What to do next?

Installation and help

- ▶ `http://reed.edu/data-at-reed/software/R/r_studio.html`
- ▶ `http://reed.edu/data-at-reed/resources/`
- ▶ `https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf`
- ▶ `http://www.cookbook-r.com/`

What to do next?

Installation and help

- ▶ `http://reed.edu/data-at-reed/software/R/r_studio.html`
- ▶ `http://reed.edu/data-at-reed/resources/`
- ▶ `https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf`
- ▶ `http://www.cookbook-r.com/`
- ▶ `cismay@reed.edu`

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University
- ▶ Worked as an actuary before obtaining PhD in Statistics from Arizona State University

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University
- ▶ Worked as an actuary before obtaining PhD in Statistics from Arizona State University
- ▶ Was Assistant Professor of Statistics and Data Science at Ripon College in Wisconsin the last two years

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University
- ▶ Worked as an actuary before obtaining PhD in Statistics from Arizona State University
- ▶ Was Assistant Professor of Statistics and Data Science at Ripon College in Wisconsin the last two years
- ▶ Moved to Portland area this summer

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University
- ▶ Worked as an actuary before obtaining PhD in Statistics from Arizona State University
- ▶ Was Assistant Professor of Statistics and Data Science at Ripon College in Wisconsin the last two years
- ▶ Moved to Portland area this summer
- ▶ Starting working at Reed one month ago today

Who am I?

Background

- ▶ Grew up in western South Dakota (town of 112 people)
- ▶ BS in Mathematics, minor in Computer Science from SDSM&T
- ▶ MS in Statistics from Northern Arizona University
- ▶ Worked as an actuary before obtaining PhD in Statistics from Arizona State University
- ▶ Was Assistant Professor of Statistics and Data Science at Ripon College in Wisconsin the last two years
- ▶ Moved to Portland area this summer
- ▶ Starting working at Reed one month ago today
- ▶ Love helping others with statistical consulting and R programming

Who am I?

When am I available?

- ▶ Generally available 9 AM to 5 PM Monday - Friday
- ▶ Email me at cismay@reed.edu or chester.ismay@reed.edu
- ▶ Office (ETC 223) hours
 - ▶ Mondays (11 AM to noon)
 - ▶ Tuesdays and Thursdays (2 PM to 3 PM)

Workshops

Data @ Reed Research Skills Workshops for Fall 2015

All workshops in ETC 211 from 4 - 5 PM

- ▶ September 16 - Data analysis with Stata
- ▶ September 23 - Data analysis with R
- ▶ September 30 - Data visualization using R
- ▶ October 7 - Maps and more: spatial data
- ▶ October 14 - Reproducible research

Thanks! (cismay@reed.edu)

HTML slides available at <http://rpubs.com/cismay/chem101>