EDS 212: Day 5, End!

Course recap

August 9th, 2024

Day 1 - Algebra warm-up & meeting our tools

Math skills & concepts covered:

- Basic unit conversions & dimensional analysis
- Back-of-the-envelope calculations & gut checks
- Exponents & logarithms (including logistic growth examples)
- Functions, function notation & terms, evaluating functions, creating a basic function in R
- Calculating average slope

Tools & workflows stuff:

- worked in Quarto docs within R Projects, then used `usethis::use_git()` and `usethis::use_github()` to connect to a remote repo

Day 1 – Algebra warm-up & meeting our tools

Other stuff:

- A graph with `{ggplot2}`

- Quarto introduction

- Made sequences with `seq()`, then evaluated a function over all values of a sequence

- Installed the `{tidyverse}`

Day 2: Derivatives!

Math skills / concepts covered:

- Derivatives (definition of the derivative, what do derivatives mean, examples of applications)
- A few derivative rules
- Partial derivatives & what they mean
- Found & evaluated derivatives (incl. higher order & partials) in R
- Plotted a function in `{ggplot2}`

Tools & workflows stuff:

- More Quarto
- Continued with git & GitHub
- Building mental model of git (git mapping)

Day 3: Differential equations

Math skills / concepts:

- What is integration and what is it useful for?

- Notation and language for differential equations (e.g. "this is a second order partial differential - equation")

- Examples of finding numeric approximations for differential equations

- Lotka-Volterra equations as a DE example

- Intro to linear algebra basics (what are scalars, vectors, & matrices), addition, subtraction & dot - products the vectors?

Day 3: Differential equations

Tools & Workflows stuff:

- New git/GitHub workflow:
    - Fork somebody else's repo > clone > create an R Project
- Git commands (in RStudio Terminal)
    - `git add`
    - `git commit`
    - `git push`

Day 4: Matrices, summary statistics & data exploration

Math skills / concepts:

- Basic matrix algebra (addition, subtraction, multiplication)

- Representing systems of linear equations w/ matrices

- Leslie matrices for population projections and projected population structures several iterations into the future

- Summary statistics (central tendency)

- Some exploratory visualizations and how to think about them (e.g. boxplots, histograms, pair plots)

Tools & Workflows stuff:

- GitHub practice (forking, cloning, making a new repo & cloning, etc.)
    - New workflow: create a new repo from scratch on GitHub, > clone > create an R Project.

Day 4: Matrices, summary statistics & data exploration

Other stuff:

- Making matrices in R

- Data exploration & summaries (intro) in R (e.g. `head()`, `tail()`, `dim()`, `names()`, summary/describe, etc.)

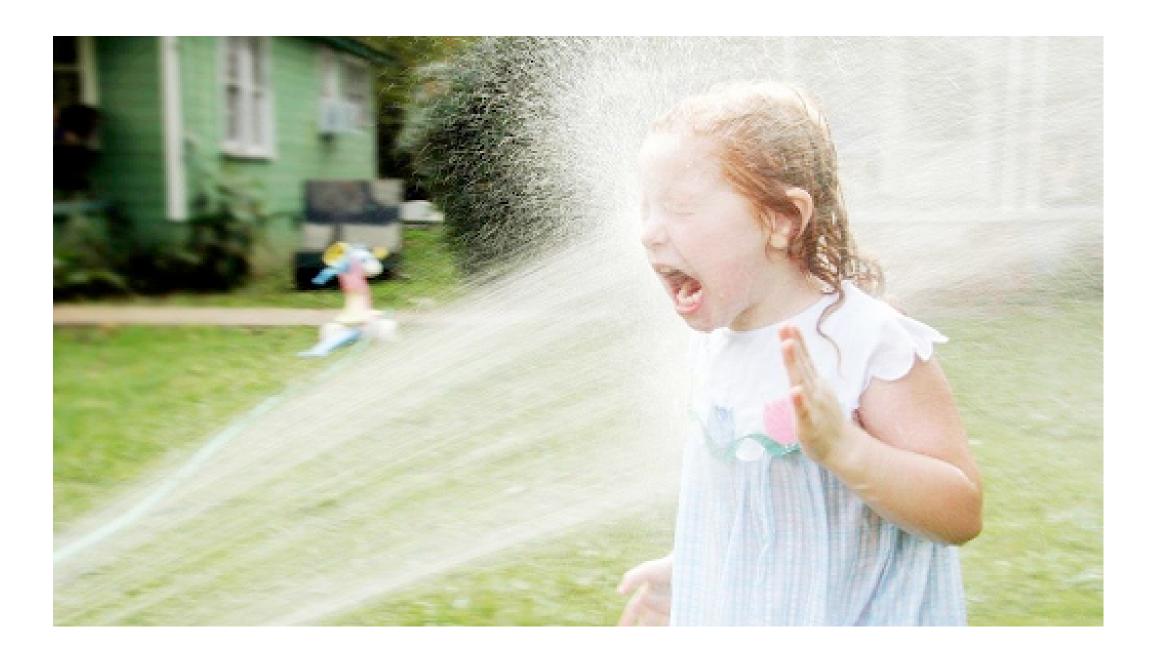- Pairs plots & histograms with `{GGally}`, `{ggplot2}`

Day 5: Summary statistics, basic probability theory

Math skills / concepts:

- Data spread (variance, standard deviation)

- Confidence interval introduction

- Basic probability theory (union, intersection, conditional probability)

- Intro to Boolean logic & operations

Tools & Workflows stuff:

- Git in terminal / git bash

- `git pull`

- git collaboration (2 collaborators, both pushing to main)

EDS 221 - Scientific Programming Essentials

Data representation, types and structures; programming and function development; iteration, conditionals, functions and objects; documentation; testing and troubleshooting; tidy data structure; and a dive to data wrangling and visualization.

Now: Please fill out your course evaluation

ESSENTIAL MATH EDS