



# *Programming II*

## Setup for Lecture



- Open Tutorial
- Packages Required:
  - Tidyverse
  - Ecdat
- Knit Document As You Go
- Read Introduction
- Prepare Your Minds for the Matrix



## Part 2: Loops



- Correlation Matrix
  - Definition: Matrix Which Shows the Correlation Between Every Pair of Numeric Variables
  - Used to Understand Strength of Linear Relationships Between Numeric Variables
  - Helpful in Measuring Collinearity
- Run Chunk 4
  - Inspect the Variables in Cigar
  - Inspect the Correlation Matrix
  - Which Variable(s) is Inappropriate for a Correlation Analysis? Why?

## Part 2: Loops



- Run Chunk 5
  - Run First Half – Loops through Every Combination of Columns and Computes Correlation
  - Examine Second Half – Loops Through Every Combination of Columns Excluding the First Column
  - Fill in Blanks with Appropriate Indices so Second Loop Works
  - Run Second Half
- Run Chunk 6
  - Inspect the Variables in H1
  - Uncomment to Print Correlation Matrix
  - What is the Problem?

## Part 2: Loops



- Run Chunk 7
  - Observe the Difference Between the Printed Tibbles
  - What is the Difference?
  - How Would You Explain the First Loop to a Toddler?
  - What is `cat()` doing?
  - How Would You Explain the Second Loop to an Infant?
  - Remember: There Are an Infinite Number of Ways to Do the Same Thing.

## Part 3: SRS



- Important For Simulation Studies
- Known Distributions

Distribution	Density/pmf	cdf	Quantiles	Random Numbers
Normal	<code>dnorm()</code>	<code>pnorm()</code>	<code>qnorm()</code>	<code>rnorm()</code>
Chi square	<code>dchisq()</code>	<code>pchisq()</code>	<code>qchisq()</code>	<code>rchisq()</code>
Binomial	<code>dbinom()</code>	<code>pbinom()</code>	<code>qbinom()</code>	<code>rbinom()</code>

- “d” -> Useful for Plotting Density Curve for Continuous Variables or Probability Mass Function for Discrete Variables
- “p” -> Finds the Probability Less Than Or Equal to a Given Number
- “q” -> Finds Cutoff Points
- “r” -> Generates a Random Sample from the Distribution

## Part 3: SRS



- For SRS, Use “r”
- Run Chunk 1
  - Scenario for x1: You Ask BLANK Number of Students There Grades where Grades Follow a Normal Distribution with Mean=82 and SD=2
  - Scenario for x2: You Ask BLANK Number of Students to Roll a Fair Die 10 Times and Tell You the Number of 6’s that Appeared.
- Try Small and Large for BLANK

## Part 3: SRS



- Sampling From Finite Set of Possible Outcomes
- Run Chunk 2
  - Scenario: Flip  $k$  Coins
    - $P(\text{Heads}) = \text{BLANK}$
    - $P(\text{Tails}) = 1 - \text{BLANK}$
  - How would You Explain What the Figure is Showing to a Politician?



Closing



Disperse  
and Make  
Reasonable  
Decisions