Install and Import Necessary PackagesThe Code	
The CodeMentioned PackagesBuilt-in Datasets	
 Other Datasets Operational Symbols Mathematical Calculations 	
BasicsInteger DivisionRemainderComparison	
 Boolean Operations TRUE / FALSE T / F 	
 and, or, not &, , ! %in% Other Basics 	
Vector.Pipe	
 Missing Data - NA Basic Features of NA Types of NA Values Explicit Values 	
 Implicit Values is.na() Remove NA Values 	
 na.rm = TRUE na.omit() drop_na() 	
 Replace NA Values fill() coalesce() Determine and "Show" Hidden NA 	
 Encoded Missing Data na_if() Implicit Missing Data 	
 pivot_wider() complete() Some operations 	
 Filtering - filter() Number of Rows nrow() length() 	
 n() count() n_distinct() 	
 Top and End of Datasets head() tail() Unique Rows in Dataset 	
 distinct() unique() Sorting - arrange() 	
 Extreme Values - top_n() Grouping - group_by() Grouping Variables To Ungroup - ungroup() 	
 Column Operations Manage Columns - select() New Columns - mutate() 	
 Summarizing Data - summarize() Other Useful Functions ⊙ Graphing - ggplot2 	
 Adjusting the Sizes for All Graphs Variation Typical Values Unusual Values 	
 Co-Variation Categorical + Numerial geom_histogram() 	
 geom_freqploy() ⊘ Categorical + Categorical geom_count() geom_tile() 	
 Seom_the() Numerical + Numerical geom_point() ✓ Layers 	
 We can specify different data for each layer. Facets facet_wrap() 	
 scales = 'free' facet_grid() Coordinate Systems Providing Good Visualizations 	
 Providing Good Visualizations basic Rules Some Advanced Rules 1. Show as few Data as Possible 	
 2. Hide the Data 3. Trick the Eyes 4. Eliminate Context 	
 5. Dwell on the Trivial 6. Label Nothing 7. Why not find something anyways? A Bunch of Examples from Lecture 	
 A Bunch of Examples from Lecture A Bunch of Examples from Homework An Example for Sociology 430 A Bunch of Examples from Lab 	
 Strings Basics of Strings in R Raw Strings 	
 Special characters Regular Expressions String Functions Combine Strings - str_c() 	
 Combine Strings - str_c() Combine Strings "Directly" - str_glue() Detect Strings - str_detect() Flatten Strings - str_flatten() 	
 String Length - str_length() String Subtraction - str_sub() Words from Sentences - word() 	
 Uppercase and Lowercase - str_to_upper(), str_to_lower() Seperate Things - separate_ With Regular Expressions 	
 str_view() str_extract() str_match() str_replace() 	
 An Example Operations on Numbers Subtracting Numbers from A String 	
parse_double()parse_number()slice()	
 round() Cutting Numbers into Ranges - cut() Creating a Sequence - seq() ☑ Tidying Data 	
 Basic Principles 	
 Multiple Values in One Cell Values of One Variables Seperated to Multiple Columns Make Data Longer - pivot_longer() Make Data Wider - pivot_wider() 	
 Relational Data: Joins How the datasets in <i>nycflight13</i> are connected Keys 	
Primary KeyForeign KeyRelations	
 Joins Differences between by and join_by Mutating Inner Joins inner_join() 	
 Mutating Outer Joins left_join() right_join() 	
• full_join()⊙ Filter Joins• semi_join()	
 ■ anti_join() ☑ Importing Data ☑ .csv Files ■ read.csv() 	
read_csv()write_csv()Spreadsheets	
 ○ Reading • readxl_example() • read_excel(), read_xls(), read_xlsx() • col_names 	
 col_names Other Parameters Writing write_xlsx() 	
 Soogle Sheet gs4_deauth(), gs4_auth() read_sheet(), range_read() 	
 gs4_get() sheet_names() sheet in read_sheet() Other importing Methods 	
 Other importing Methods ✓ Factors Basics Providing v.s. Not Providing Levels 	
 Order of Values Example with General Social Survey Recoding Factors 	
fct_recode()fct_collapse()	
fct_lump()	
 Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times 	
 Dates and Time Basics Codes for Date and Time 	
 Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() 	
 Dates and Time Basics Codes for Date and Time ○ Converting Strings to Dates and Times ○ Date Parsers ○ ymd() ○ mdy() ○ dmy() ○ Date-Time Parsers ○ strptime() ○ "Rounding" Time - floor_date() ○ Time Zone - tz ○ The Epoch ○ Date-Time Components 	
 Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() dmy() odny() strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch 	
 Dates and Time Basics Codes for Date and Time ○ Converting Strings to Dates and Times ○ Date Parsers ○ ymd() ○ mdy() ○ dmy() ○ bate-Time Parsers ○ strptime() "Rounding" Time - floor_date() • Time Zone - tz • The Epoch ⊙ Date-Time Components ⊙ Make Date/Date-Time Components ○ make_date() ● make_datetime() 	
 Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() dmy() obate-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_date(i) Getting Date-Time Components Time Spans duration class periods class Conditional Execution if and/or else ifelse() 	
 Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() dmy() obte-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_datetime() Getting Date-Time Components Time Spans duration class periods class Conditional Execution if and/or else ifelse() 	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() dmy() dmy() dmy() dmy() Time Parsers strptime() Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_datetime() Getting Date-Time Components Time Spans duration class periods class periods class Conditional Execution if and/or else ifelse() if - elseif - else Example Iteration for loop while loop Key Words	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers Jund() May() May() May() May() Make Date-Time Parsers Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components Make Date/Date-Time Components Make Date/Date-Time Components Make Jatetime() Getting Date-Time Components May date() Make Jatetime() Getting Date-Time Components Time Spans Muration class Periods class Conditional Execution if and/or else if else() if - elseif - else Example Fireration Multiplication for loop While loop Key Words next break Example	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() mdy() mdy() Date-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_datetime() Getting Date-Time Components Time Spans duration class periods class periods class Conditional Execution if and/or else ifelse() if_else() if_else() if_else() if_else() for loop while loop Key Words next hreak	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() mdy() mdy() Date-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch Date-Time Components Make Date-Date-Time Components make_date() make_date() make_datetime() Getting Date-Time Components duration class periods class Conditional Execution if and/or else if else() if - elseif - else Example Iteration for loop while loop Key Words next break Example Write Functions General Format Example Statistical Model To Define A Model	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() mdy() Date-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - tz The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_date() duration class periods class Conditional Execution if and/or else if else() if - elseif - else Example Next break Example Write Functions General Format Example Write Functions General Format Example Write Functions General Format Example Statistical Model	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers pmd() mdy() day() Date-Time Parsers strptime() "Rounding" Time - floor_date() Time Zone - /2 The Epoch Date-Time Components Make Date/Date-Time Components make_date() make_date() make_date() make_date() festing Date-Time Components Components Components franction class periode class Conditional Execution franction for loop white loop Key Words next broak Example Write Functions General Format Example Write Functions General Format Example 2 Example 2 Example 2 Example 2 Example 3 Statistical Model To Define A Model Basics Model Classes Model Fitting Model Selection Linear Model The Inn() Command Summary of the Innear Model - summary()	
Dates and Time Basics Codes for Date and Time Coroverting Strings to Dates and Times Date Parisers jmul() maly() day() day() The Finer Parisers surptime() Trounding" Time - floor date() Time Zone - tz The Fpoch Date-Time Components make date() ma	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsers ymd() mdy() diny() Date-Time Parsers strptime() Time Zone - tz The Epoch Date-Time Components Make Date Date-Time Components make date() make date() make date() make date() make date() firme Sons duration class periods class Conditional Execution ff and/or else felse() felse() felse() felse() frestaif - else Example Iteration for loop while loop Key Words next break Example Virite Functions General Fornat Example 1 Example 2 Example 3 Sintistical Model To Define A Model Basics Model Classes Model - timer Model The lm() Commund Summary of the Linear Model - summary() "Coefficients" Residuats	
Dates and Time Basics Codes for Date and Time Converting Strings to Dates and Times Date Parsors Jonal() Andy() Andy() Date-Time Parsers Strington() Time John John John John John John John John	
Dates and Time Bassies Codes for Date and Time Correcting Strings to Dates and Times Date Parsors January Date Parsors January Date Parsors January Date-Time Passets Suprime() "Rounding" Time - floor date() Time Zone - r. The Epoch Date-Time Components Make Date: Date-Time Components Date-Time Spans daration class periods class Conditional Execution January Make Date Make Date: Date-Time Components Components Make Date: Date-Time Components Make Date: Date-Time Components Make Date: Date-Time Components Conditional Execution January Make Date	
O Dates and Time ■ Basics ■ Codes for Date and Time ○ Converting Strings to Dates and Times ○ Date Parsers ■ smal() ■ mah() ■ day() ■ day() ■ Date-Time Parsers ■ steption() ■ "Reanding" Time - floor date() ■ Time Zone - z ■ The Epoch ○ Date-Time Components ○ Make Date-Date-Time Components ■ make date() ■ familion class ■ periods class ○ Conditional Execution ■ familion class ■ periods class ○ Conditional Execution ■ familion class ■ familion class ■ familion ■ for loop ■ white loop ○ Key Words ■ mex ■ bean ■ Example ○ Write Functions ■ General Format ■ Example 1 ■ Example 1 ■ Example 2 ■ Example 3 ○ Statistical Model ○ To Define A Model ■ Basics ■ Model Classes ■ Model Futing ■ Model Selection ○ Linear Model ■ The hat/ Command ○ Summary of the Linear Model - nonnonny() ■ "Coefficients" ■ Revidents ■ Model Selection ○ Linear Model ■ The hat/ Command ○ Summary of Goodiness-of-Fit ■ Transforming to Log (I ng Transformation) ○ Simple Linear Regression ■ Define a Numple Linear Regression ■ Define Repression ■ Define Repression ■ Introduction of Multiple Linear Regression ■ Introduction of Multiple Linear Regression ■ Interactions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Interactions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Interactions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Interactions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Assumptions Ferms ■ Reculdifying Predictors - Example with int00 dat ■ Command	
O Dates and Time ■ Basics ■ Codes for Date and Time ○ Converting Strings to Dates and Times ○ Date Parsons ■ yould) ■ date(d) ■ date(d) ■ date(d) ■ date(d) ■ The Parsons ■ Steptane(d) ■ The Epoch ○ Date-Time Parsons ■ Make Date(Date-Time Components ■ make_date(mate) ■ make_date(d) ■ make_date(d) ■ make_date(mate) ■ Getting Date-Time Components ■ doration class ■ periods class ○ Conditional Execution ■ if and/or else ■ if alse(d) ■ if a	
O Dates and Lime	
O Dates and Time ■ Basics ■ Codes for Date and Time ○ Conventing Strings to Dates and Linnes ○ Date Traces ■ ***********************************	
O Dates and Time ■ Basics ■ Codes for Date and Time ○ Converting Strings to Dates and Times ○ Date Pre-one ■ Junit() ■ Judy () ■ Judy () ■ Judy () ■ Judy () ■ The Lame Patients ■ Junit() ■ Judy () ■ The Lame Patients ■ Judy () ■ The Lame Patients ■ Judy () ■ The Lame Patients ■ Judy () ■ The Lame Components ○ Make Date Date-Time Components ■ Judy Junit() ■ Ju	
O Dates and Time • Basics • Codes to Date and Time O Theresting Strings in these and Lines O Date Paries • strength of the date of the string of the s	
O Bates and Time Races Clocke for hister and Time Conventions Straight in these and I mus. Dick Planes punit advi) Bates Time Races virial Rounding Time - flow_alary Bates Time Components. National Time Components. National Education and Education Analog Education Conting Dates Times Components and Education and Education Conting Dates Times Components and Education Analog Education Continued Execution Analog Education Analog Analog Analog Education Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog Analog An	
O Dieles and Time Raises Coffee for Date and Time Diele Planers math m	
O Bates and Time ■ Ratics ■ Colores to Date and Time O Converting Strangs to Dates and Times O Libric Planests ■ mid() ■ Powering Strangs to Dates and Times O Dates Time Compensate O Made Dates Time Components ■ mid() Libric Planes Times Components ■ mid() Libric Dates Times ■ Mid	
Barres and Finne Barres Color in Date and Linear Coverating Strings to Dates and Times Coverating Strings to Dates and Times Dates Time Strings May May May May May Time Zome Ti	
Others and Time □ Basics □ Concess for Date and Tume ○ Conversing Strings to Jones and Times □ Date Tume Process □ remain() □ wind () □ Date-Tume Parents □ remain() □ limit Concess □ Process □	

⊙ Statistical 306