Permium roadmap to learning R programming,

Phase 1: Introduction to R

1. **Getting Started**
    - Install R and RStudio.
    - Understand the RStudio interface.
    - Learn basic syntax and commands.
2. **Key Concepts**
    - Variables and data types (numeric, character, logical, factor).
    - Arithmetic and logical operators.
    - Basic functions (print(), sum(), mean(), etc.).
3. **Resources**
    - **Books**: *R for Data Science* by Hadley Wickham.
    - **Courses**: FreeCodeCamp R tutorial or Codecademy's beginner R course.

Phase 2: Data Structures

1. **Essential Structures**
    - Vectors, matrices, and arrays.
    - Data frames and lists.
2. **Basic Operations**
    - Indexing and subsetting.
    - Manipulating data frames (adding/removing columns, filtering rows).
3. **Practice**
    - Create datasets from scratch.
    - Use built-in datasets like mtcars, iris.

Phase 3: Data Manipulation

1. **Packages**
    - Install and load packages (install.packages(), library()).
    - Introduction to the tidyverse.
2. **Key Tools**
    - dplyr: Filtering, selecting, mutating, summarizing.
    - tidyr: Reshaping and tidying data.
3. **Practice**
    - Clean and manipulate messy datasets.
    - Explore datasets with dplyr and tidyr.
4. **Resources**
    - Tidyverse cheatsheets.
    - Tutorials on Kaggle or Coursera.

Phase 4: Data Visualization

1. **Using ggplot2**
    - Basic syntax of ggplot2.
    - Types of plots: scatterplots, bar plots, histograms, boxplots.
2. **Customization**
    - Titles, labels, themes, and annotations.
    - Adding layers (e.g., lines, points).
3. **Practice**
    - Visualize datasets like diamonds and mpg.
    - Experiment with custom themes and colors.
4. **Resources**
    - *ggplot2: Elegant Graphics for Data Analysis* by Hadley Wickham.

Phase 5: Statistical Analysis

1. **Basic Statistics**
    - Descriptive statistics (mean, median, mode, standard deviation).
    - Correlation and covariance.
2. **Hypothesis Testing**
    - T-tests, chi-square tests, ANOVA.
3. **Regression**
    - Linear regression.
    - Logistic regression.
4. **Resources**
    - *An Introduction to Statistical Learning*.
    - R documentation on stats.

Phase 6: Advanced Topics

1. **Programming Constructs**
    - Loops (for, while) and conditional statements (if, else).
    - Writing functions and reusable code.
2. **Working with Data**
    - Handling large datasets.
    - Import/export data (CSV, Excel, databases).
3. **Time Series Analysis**
    - Packages: zoo, xts, forecast.
    - Methods: ARIMA, exponential smoothing.
4. **Machine Learning**
    - Use packages like caret and mlr3.
    - Explore clustering, decision trees, and random forests.
5. **Practice**
    - Build predictive models on datasets like Boston or Titanic.

Phase 7: Shiny and Reporting

1. **Interactive Dashboards**
    - Learn Shiny basics.
    - Build simple dashboards and apps.
2. **Markdown and Reporting**
    - Create RMarkdown documents.
    - Automate reports with knitr.

Phase 8: Real-World Projects

1. **Capstone Projects**
    - Analyze large datasets and present findings.
    - Examples:
        - Predicting house prices.
        - Visualizing COVID-19 trends.
        - Exploring customer churn data.
2. **Portfolio**
    - Host code on GitHub.
    - Create a portfolio website to showcase projects.

Phase 9: Continuous Learning

1. **Stay Updated**
    - Follow R blogs like R-Bloggers.
    - Participate in R communities (Stack Overflow, Reddit).
2. **Competitions**
    - Join Kaggle or DrivenData contests.
    - Contribute to open-source R projects.

3. **Advanced Resources**
    - Explore specific domains like bioinformatics, finance, or spatial analysis using R.
