**Chapter 13: PCA and Factor Analysis**

**PCA**

Open the mtcars.csv data in Jamovi. This data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles.

The variables can be described as follows:

mpg Miles per(US) gallon

cyl Number of cylinders

disp Displacement (cu.in.)

hp Gross horsepower

drat Rear axle ratio

wt Weight (1000 lbs)

qsec 1/4 mile time

vs Engine (0 = V-shaped, 1 = straight)

am Transmission (0 = automatic, 1 = manual)

gear Number of forward gears

carb Number of carburetors

Conduct a Principal Components Analysis (PCA) to reduce the number of variables that describe the characteristics of the automobiles.

Describe the assumption test results and the PCA results.

**EFA**

Use the Job Burnout.csv file.

This is a survey of 99 employees using the Maslach-Burnout Inventory General Survey (MBI-GS). The survey questions are as follows:

Question 1 I feel emotionally drained from my work.

Question 2 I feel used up at the end of the workday.

Question 3 I feel tired when I get up in the morning and have to face another day on the job.

Question 4 Working all day is really a strain for me.

Question 5 I can effectively solve the problems that arise in my work.

Question 6 I feel burned out from my work.

Question 7 I feel I am making an effective contribution to what this organization does.

Question 8 I have become less interested in my work since I started this job.

Question 9 I have become less enthusiastic about my work.

Question 10 In my opinion, I am good at my job.

Question 11 I feel exhilarated when I accomplish something at work.

Question 12 I have accomplished many worthwhile things in this job.

Question 13 I just want to do my job and not be bothered.

Question 14 I have become more cynical about whether my work contributes anything.

Question 15 I doubt the significance of my work.

Question 16 At my work, I feel confident that I am effective at getting things done.

The MBI-GS suggests that job burnout comprises of three major subscales namely exhaustion, cynicism, and professional efficacy. Based on this scale, questions 1,2,3,4 and 6 correspond to exhaustion, questions 8,9,13, 14, and 15 correspond to cynicism, and questions 5,7,10,11, and 12 correspond to professional efficacy

Conduct an exploratory factor analysis to see if the data will show the same three categories of underlying factors.