Assignment 3
(ANOVA) Files

Sukanya Mukherjee

128041217

BAN100ZBB

Statistics for Analytics

Samaneh Gholami

Assignment 3 (ANOVA) Files:

Problem 1 [10 marks] Use 5% as a significance level

In the last decade stockbrokers have drastically changed the way they do business. Internet trading has became quite common and online trades can cost as little as $7. It is now easier and cheaper to invest in the stock market than ever before. What are the effects of these changes? To help answer this question, a financial analyst randomly sampled **366** American households and asked each to report the age of the head of the household and the proportion of their financial assets that are invested in the stock market. The age categories are:
Young (under 35)
Early middle age (35 to 40)
Late middle age (50 to 65)
Senior (over 65)
The analyst was particularly interested in determining whether the ownership of stocks varied by age. Do these data allow the analyst to determine that there are differences in stock ownership between the four age group? Check the required conditions.
File: Proportion of Total Assets Invested in Stocks Problem

Answer: Use One – way ANOVA

Step1:

H0: There is no difference in stock ownership between the four age groups
HA: There is at least one difference in stock ownership between the four age groups
α: 0.05

Step2:

ANOVA Table:

Source	Degree of freedom	Sum of Squares	Mean Squares	F
Among Groups (Model)	k-1 = 4-1 = 3	SSA = 42645.2	MSA = SSA/k-1 = 42645.2/3 = 14215.1	Fstat = MSA/MSW = 31.8
Within Groups (Error)	n-k = 366-4= 362	SSW = 161871.3	MSW = SSW/n-k = 161871.3/362 = 447.2	
Total	n-1 = 366-1= 365	SST = 204516.5	MST = SST/n-1 = 204516.5/365 = 560.3	

Fcritical: 2.6049

Fstat (31.8) >= Fcritical (2.6049)
We reject Null hypothesis (H0)
Conclusion: There is at least one difference in stock ownership between the four age groups.

Problem 2 [10 marks]

One measure of the health of a national economy is how quickly it creates jobs. One aspect of this issue is the number of jobs individual hold. As part of a study on job tenure, a survey was conducted wherein Americans aged between 17 and 45 were asked how many jobs they have hold in their lifetimes. Also recorded were gender and educational attainment. The categories are:
Less than high school (E1)
High school (E2)
Some college/university but not degree (E3)
At least one university (E4)
File: Comparing the Lifetime Number of Jobs by Educational Level (Organize Data by Gender and Education)
A. Test to determine whether there is interaction between gender and education in holding jobs.
B. Test to determine whether there are differences in holding jobs between men and women.
C. Test to determine whether there are differences in holding jobs between the educational levels.

Answer: Use Two – way ANOVA

Step1: Three Hypothesis

A.

H0: There is no interaction between gender and education in holding jobs.
HA: There is at least one interaction between gender and education in holding jobs.

B.

H0: There are no differences in holding jobs between men and women.
HA: There is at least one difference in holding jobs between men and women.

C.

H0: There are no differences in holding jobs between the educational levels.
HA: There is at least one difference in holding jobs between the educational levels.

Individual	E1	E2	E3	E4	Row Total
Male	10	12	15	8	432
	9	11	8	9	
	12	9	7	5	
	16	14	7	11	
	14	12	7	13	
	17	16	9	8	
	13	10	14	7	
	9	10	15	11	
	11	5	11	10	
	15	11	13	8	
Female	7	7	5	7	402
	13	12	13	9	
	14	6	12	3	
	6	15	3	7	
	11	10	13	9	
	14	13	11	6	
	13	9	15	10	
	11	15	5	15	
	14	12	9	4	
	12	13	8	11	
Column Total	241	222	200	171	834

α: 0.05

Step2:

ANOVA Table:

Source	Degree of freedom	Sum of Squares	Mean Squares	Fstats	Fcritical
Gender	a-1 = 2-1 = 1	SSa = 11.25	MSa = SSa/a-1 = 11.25/1 = 11.25	MSa/MSe = 11.25/-20.6 = -0.5	4
Educational Level	b-1 = 4-1 = 3	SSb = 135.85	MSb = SSb/b-1 = 135.85/3 = 45.3	MSb/MSe = 45.3/-20.6 = -2.2	2.72
Gender* Educational Level	(a-1) (b-1) = 1*3 = 3	SSab = 2218.2	MSab=SSab/(a-1) (b-1) = 2218.2/3 = 739.4	MSab/MSe = 739.4/-20.6 = -35.8	2.72
Error	n-ab = 80-2*4= 80-8 = 72	SSe = -1485.75	MSe=SSe/(n-ab) = -1485.75/72 = -20.6		
Total	n-1 = 80-1 = 79	SSt = 879.55			

1. Fstat (-35.8) < Fcritical (2.72)

We fail to reject Null hypothesis (H0)

Conclusion: There is no interaction between gender and education in holding jobs.

2. Fstat (-0.5) < Fcritical (4)

We fail to reject Null hypothesis (H0)

Conclusion: There are no differences in holding jobs between men and women.

3. Fstat (-2.2) < Fcritical (2.72)

We fail to reject Null hypothesis (H0)

Conclusion: There are no differences in holding jobs between the educational levels.