Assignment 4

2)

Group1	μ	deviation	dev.^{2}
51	48.2	2.8	7.84
45	48.2	-3.2	10.24
33	48.2	-15.2	231.04
45	48.2	-3.2	10.24
67	48.2	18.8	353.44

Group2	μ	dev.	dev^2
23	35.4	-12.4	153.76
43	35.4	7.6	57.76
23	35.4	-12.4	153.76
43	35.4	7.6	57.76
45	35.4	9.6	92.16

Group3	μ	dev.	dev.^{2}
56	69.8	-13.8	190.44
76	69.8	6.2	38.44
74	69.8	4.2	17.64
87	69.8	17.2	295.84
56	69.8	-13.8	190.44

Sum of dev^2 = 612.8, 515.2, 732.8

$Var_1 = \frac{612.8}{5-1} = 153.2$

$Var_2 = \frac{515.2}{5-1} = 128.8$

$Var_3 = \frac{732.8}{5-1} = 183.2$

$MS_{error} = \frac{153.2+128.8+183.2}{3} = 155.07$

$df_{error} = 15-3 = 12$

$SS_{error} = (155.07)(15-3) = 1860.8$

Grand mean $= \frac{48.2+35.4+69.8}{3} = \underline{51.13}$

group mean	grand mean	dev.	dev.^{2}
48.2	51.13	-2.93	8.58
35.4	51.13	-15.73	247.43
69.8	51.13	18.67	348.57

Sum of sq. (SS_{mean}) = 604.58

Var. means $= \frac{604.58}{3-1} = \underline{302.29}$

$MS_{btn.} = 302.29 \times 5 = 1511.45$

$df_{groups} = 3-1 = 2$

$SS_{group} = 1511.43 (3-1) = 3022.9$

Test static & critical value:- $F = \frac{1511.45}{155.07} = 9.75$

$F_{critical}(2,12) = 3.89$ → Decision
↳ reject H_0

Annova table

Source	SS	df	MS	F
group	3022.9	2	1511.45	9.75
error	1860.9	12	155.07	
total	4883.7			

Effect size → $\eta^2 = \frac{3022.9}{4883.7} = .62$

(3) F test → $\frac{\text{estimate of } \sigma^2 \text{ from mean}}{\text{est. of } \sigma^2 \text{ from individuals}}$

$F = \frac{\text{Var. btn treatments}}{\text{Var. within treatment}}$

for 1st → $N = 5$, mean $= 150/5 = 30$

$SD = \sqrt{\frac{1}{n-1}\Sigma(x-x_n)^2} = \sqrt{\frac{1}{5-1}(10-30)^2 \ldots + (50-30)^2}$

$= 15.8114$

$Var = SD^2 = 250$

for 2nd → N = 5

Mean = 75/5 = 15

$\sigma = \sqrt{\frac{1}{4}((5-15)^2 + \cdots + (25-15)^2)} = 7.9057$

Var. $= \sigma^2 = 62.5$

$\therefore$ F test $= 250/62.5 = 4$

(1)

	HS	B	M	Phd	T
F	50.886	49.868	50.377	49.868	201
M	49.114	48.132	48.623	48.132	194
T	100	98	99	98	395

dof $= (2-1)(4-1) = 3$

$\chi^2 = \frac{(60-50.886)^2}{50.886} + \cdots + \frac{(57-48.132)^2}{48.132} = 8.006$

$\chi^2_{critical}$ with 3 dof $= 7.815$

$\therefore$ We reject null hypothesis $\leftarrow$ ed. level depends on 5% level of significance.

Expected value $= \frac{(60+60) \times 201}{395}$ $\left(f_e = \frac{f_c f_r}{n}\right)$