MATH ~~4581~~ : F18

HW 3.

(1) χ^2 #6 2-way Table.

Observed

	A	B	C	D	Total
a	30	20	15	7	72
b	20	30	30	18	98
Total	50	50	45	25	170

Expected

	A	B	C	D	Total
a	21.18	21.18	19.06	10.59	72
b	28.82	28.82	25.94	14.41	98
Total	50	50	45	25	170

$df = (r-1)(c-1)$
$= 3$

GOF Test: $\chi^2 = 10.098$

$p = 0.0178 < 0.05$

$\Rightarrow$ reject H_0, do not accept that variables are independent.

(2) ANOVA #1.

$F = 0.0924$

$p = 0.964 > 0.05$

$\Rightarrow$ accept H_0, groups have the same mean.

(3) ANOVA #2

$F = 2.99$

$p = 0.062 > 0.05$

$\Rightarrow$ accept H_0, grades in sections have same mean.

④ ANOVA #3.

$F = 0.126$

$p = 0.882$

$\Rightarrow$ accept H_0, groups have same mean

③ ANOVA #5.

Contrast $C = \mu_1 + \mu_2 - \mu_3 - \mu_4$.

$\hat{C} = \bar{x}_1 + \bar{x}_2 - \bar{x}_3 - \bar{x}_4 = 0.025$

$\bar{x}_1 = 4.02$

$\bar{x}_2 = 4.08$

$\bar{x}_3 = 3.975$

$\bar{x}_4 = 4.1$

$n_1 = 6$

$n_2 = 5$

$n_3 = 12$

$n_4 = 11$

$df = n - k$

$= 34 - 4$

$= 30$

$S_{xp} = \sqrt{MSE} = 0.605$

$$t = \frac{\hat{C}}{S_{xp}\sqrt{\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \frac{1}{n_4}}}$$

$$= \frac{0.025}{0.605\sqrt{0.54}}$$

$$= 0.056$$

Now $t_{30,\,0.025} = 2.042$

since $|t| < 2.042$

$\Rightarrow$ accept H_0, the two groups have same means.

(8) ANOVA #6: tot pairs

$$t_{ij} = \frac{\bar{x}_i - \bar{x}_j}{s_p \sqrt{\frac{1}{n_i} + \frac{1}{n_j}}}$$

$\bar{x}_1 = 331.33$ $\quad n_1 = 15$ $\quad s_p = 43.06$

$\bar{x}_2 = 355.15$ $\quad n_2 = 13$

$\bar{x}_3 = 370.07$ $\quad n_3 = 14$

$$t_{1,2} = \frac{-23.82}{43.06\sqrt{0.1436}} = -1.46$$

$$t_{1,3} = -\frac{38.74}{43.06\sqrt{0.138}} = -2.42$$

$$t_{2,3} = -\frac{14.92}{43.06\sqrt{0.148}} = 0.901$$

sig. level $\alpha = 0.05$, 3 pairs.

$\Rightarrow \alpha' = \frac{0.05}{3} = 0.017$; $df = n - k = 39$.

$$t_{39, \frac{\alpha'}{2}} \approx t_{40, 0.0085} = 2.704$$

$\Rightarrow$ accept H_0 for all 3 pairs.