1 Problem 21.6

a)

Source	SS	df	MS
Blocks	433.3667	9	48.152
Training methods	1,295.0	2	647.5
Error	112.3333	18	6.241
Total	1,840.7	29	

b) $\bar{Y}_{.1} = 70.6$, $\bar{Y}_{.2} = 74.6$, $\bar{Y}_{.3} = 86.1$

c) H_0: all τ_j equal zero, H_a: not all τ_j equal zero.

$F^* = 103.754 > F(.95, 2, 18) = 3.55$. Conclude H_a.

d) $\hat{D}_1 = \bar{Y}_{.1} - \bar{Y}_{.2} = -4.0$, $\hat{D}_2 = \bar{Y}_{.1} - \bar{Y}_{.3} = -15.5$, $\hat{D}_3 = \bar{Y}_{.2} - \bar{Y}_{.3} = -11.5$, $s(\hat{D}_i) = 1.1172$, $q(.9, 3, 18) = 3.10$, $T = 2.191$.

$-6.45 \leq D_1 \leq -1.55$, $-17.95 \leq D_2 \leq -13.05$, $-13.95 \leq D_1 \leq -9.05$

2 Problem 21.18

$\hat{E} = 3.084$

3 Problem 26.10

a)

Source	SS	df	MS
States (A)	6976.84	2	3488.42
Cities B(A)	167.6	6	27.933
Error	3893.2	36	108.1441
Total	11,037.64	44	

b) $F^* = 32.257 > F(.95, 2, 36) = 3.26$.

Conclude H_a: not all α_i equal zero. (i=1, 2, 3).

c) $F^* = .258 < F(.95, 6, 36) = 2.36$.

Conclude H_0: all $\beta_{j(i)}$ equal zero.

d) $\alpha \leq .1$

4 Problem 26.11

a) $\bar{Y}_{11.} = 40.2$, $s(\bar{Y}_{11.}) = .4651$, $t(.975, 36) = 2.028$,

$30.77 \leq \mu_{11} \leq 49.63$

b) $\bar{Y}_{1..} = 40.8667$, $\bar{Y}_{2..} = 57.3333$, $\bar{Y}_{3..} = 26.8667$, $s(\bar{Y}_i) = 2.6851$, $t(.995, 36) = 2.7195$,

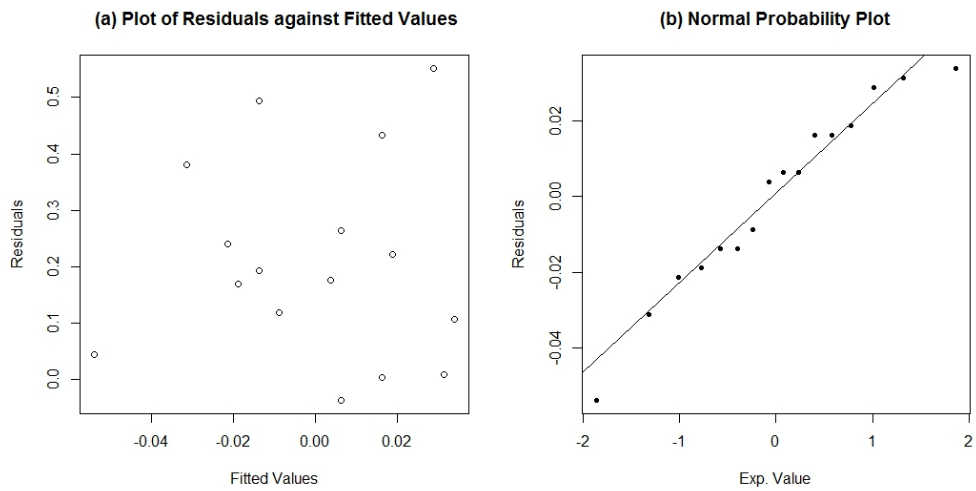
$33.565 \leq \mu_1 \leq 48.169$, $50.031 \leq \mu_2 \leq 64.635$, $19.565 \leq \mu_3 \leq 34.169$

c) $\hat{L}_1 = \bar{Y}_{1..} - \bar{Y}_{2..} = -16.4666$, $\hat{L}_2 = \bar{Y}_{1..} - \bar{Y}_{3..} = 14.0$, $\hat{L}_3 = \bar{Y}_{2..} - \bar{Y}_{3..} = 30.4666$, $s(\hat{L}_i) = 3.7973$, $q(.90, 3, 36) = 2.998$, $T = 2.12$

$-24.52 \leq L_1 \leq -8.42$, $5.95 \leq L_2 \leq 22.05$, $22.42 \leq L_3 \leq 38.52$

d) $\hat{L} = 12.4$, $s(\hat{L}) = 6.5771$, $t(.975, 36) = 2.028$, $-.94 \leq L \leq 25.74$

5 Problem 28.22



The correlation coefficient between the ordered residuals and their expected values under normality is 0.98. The residuals are random and normally distributed.

6 Problem 28.23

Source	df	SS	MS
Period	3	0.005 92	0.001 97
Subject	3	0.034 62	0.011 54
Treatment	3	0.4333	0.144 44
Drug X	1	0.228 01	0.228 01
Drug Y	1	0.195 81	0.195 81
XY Interactions	1	0.009 51	0.009 51
Residuals	6	0.009 04	0.001 51
Total	15	0.482 91	

a) The model to be used is:

$$Y_{ijkl} = \mu_{...} + \rho_i + \kappa_j + \alpha_k + \beta_l + (\alpha\beta)_{kl} + \varepsilon_{ijkl}$$

b) Hypotheses:
H_0 : All $(\alpha\beta)_{kl} = 0$ (There's no interaction between the two drugs)
H_1 : At least one $(\alpha\beta)_{kl} \neq 0$ (There's interaction between the two drugs)
at 10% significance level
Test Statistics:

$$F^* = \frac{MSXY}{MSE} = \frac{0.00951}{0.00151} = 6.298$$

Decision: If $F^* > F_{(0.9,1,6)} = 3.776$, we reject H_0, otherwise we fail to reject H_0.
Conclusion: Since $F^* = 6.298 > 3.776$, we reject H_0 and conclude that there is interaction effect between Drugs X and Y.

c) $\bar{Y}_{..1} = 0.0050$, $\bar{Y}_{..2} = 0.1950$, $\bar{Y}_{..3} = 0.1775$, $\bar{Y}_{..4} = 0.4650$, $t_{(0.95,6)} = 1.943$, $s\{\hat{L}\} = 0.0389$

$$\hat{L} = \bar{Y}_{..2} - \bar{Y}_{..1} - \bar{Y}_{..4} + \bar{Y}_{..3} = 0.1950 - 0.0050 - 0.4650 + 0.1775 = -0.0975$$

$$\hat{L} \pm t_{(0.95,6)} s\{\bar{Y}\} \quad \Longrightarrow \quad -0.0975 \pm 1.943(0.0389) \quad \Longrightarrow \quad -0.1731 \leq L \leq -0.0219$$