

9.16

NO.

DATE

$$\bar{Y}_{10} = \frac{14+10+18+13+11}{5} = 13.2$$

$$\bar{Y}_{20} = \frac{24+21+27+22+20}{5} = 22.8$$

$$\bar{Y}_{30} = \frac{5+1+8+1+2}{5} = 3.4$$

$$\bar{Y}_{40} = \frac{20+13+21+12+15}{5} = 17$$

$$\bar{Y}_{..} = \frac{14+10+11+15}{20} = \frac{282}{20} = 14.1$$

$$\bar{Y}_{.1} = \frac{14+24+5+20}{4} = 15.8$$

$$\bar{Y}_{.2} = \frac{10+21+1+13}{4} = 11.3$$

$$\bar{Y}_{.3} = \frac{18+27+8+21}{4} = 18.5$$

$$\bar{Y}_{.4} = \frac{13+22+1+16}{4} = 13$$

$$\bar{Y}_{.5} = \frac{11+20+2+15}{4} = 12$$

9.17

$$\sum_{i=1}^k \sum_{j=1}^b Y_{ij}^2 = 14^2 + 10^2 + 18^2 + \dots + 15^2 = 5126 \quad \bar{Y}_{..} = 14.1$$

$$SST = \sum_{i=1}^k \sum_{j=1}^b Y_{ij}^2 - \frac{(\sum Y_{ij})^2}{n} = 5126 - 5 \cdot 4 \cdot 14.1^2 = 1149.8$$

$$SSTR = 5(13.2-14.1)^2 + 5(22.8-14.1)^2 + 5(3.4-14.1)^2 + 5(17-14.1)^2 = 997$$

$$SSB = 4(15.8-14.1)^2 + 4(11.3-14.1)^2 + 4(18.5-14.1)^2 + 4(13-14.1)^2 + 4(12-14.1)^2 = 152.44$$

$$SSE = SST - SSTR - SSB = 1149.8 - 997 - 152.44 = 0.36$$

$$SSTR = 997$$

自由度

$$k-1=3$$

$$MSTR = \frac{997}{3} = 332.3$$

$$SSB = 152.44$$

$$b-1=4$$

$$MSB = \frac{152.44}{4} = 38.1$$

$$SSE = 0.36$$

$$(k-1)(b-1)=12$$

$$MSE = \frac{0.36}{12} = 0.03$$

$$SST = 1149.8 \quad 20-1=19$$

9.18

$$MSTR = 332.3$$

$$MSE = 0.03$$

$$F_1 = \frac{332.3}{0.03} = 11076.67$$

$$\alpha = 0.05$$

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_4$$

$$H_1: \alpha_i \text{ 不全等}$$

$$F_{0.05}(b-1, (k-1)(b-1)) = F_{0.05}(3, 12) = 3.49$$

$$F_1 = 11076.67 > 3.49 \quad \therefore \text{拒绝 } H_0 \text{ 有显著差异}$$

$$H_0: \beta_1 = \beta_2 = \dots = \beta_5$$

$$H_1: \beta_j \text{ 不全等}$$

$$F_2 = \frac{MSB}{MSE} = \frac{38.1}{0.03} = 1270 > 3.26$$

也拒绝 H_0 集区对学习英文有显著差异