

Answers to Homework 10

Quiz 10 answers:

1. D. [ There are four treatments each applied once in six blocks;  
 so  $se(\bar{y}_i - \bar{y}_j) = \sqrt{0.87(\frac{1}{6} + \frac{1}{6})} = 0.5385 \Rightarrow CI.width = 2 \times 2.131 \times 0.5385 = 2.30$  ]
2. C. [ blocks and error SS are pooled  $\Rightarrow error.MS = \frac{31.6+13.0}{5+15} = \frac{44.6}{20} = 2.23$  ]
3. E. [ compare the effect of  $Q$  at  $P0$  with the effect of  $Q$  at  $P1$  (or, equivalently, the effect of  $P$  at  $Q0$  with the effect of  $P$  at  $Q1$ ). A measure of the interaction is the difference between these  $= (y_{11} - y_{10}) - (y_{01} - y_{00}) = (y_{11} - y_{01}) - (y_{10} - y_{00}) = y_{11} - y_{10} - y_{01} + y_{00}$ . This is greatest for E. ]
4. A. [  $p > 0.05 \Rightarrow$  interaction not significant  $\Rightarrow$  additive model appropriate ]
5. D. [ C.d.f = 4, so there are five levels of  $C$ ; and similarly 3 levels of  $D$ ;  
 and there are 60 observations in all, since total.d.f = 59. ]

Homework 10 answers:

1. B. [ must have each treatment once in each block; D is possible, but too patterned: it would be appropriate for a Latin square experiment. ]
2. A. [  $F_{4,24} = 6.25$ , cf.  $c_{0.95}(F_{4,24}) = 2.776$  and  $c_{0.99}(F_{4,24}) = 4.218$ ;  
 $F_{6,24} = 3.25$ , cf.  $c_{0.95}(F_{6,24}) = 2.508$  and  $c_{0.99}(F_{6,24}) = 3.667$  ]
3. E.
4. C.
5. D. [ error.d.f =  $31 - 3 - 3 - 3$  ]

6. (a)

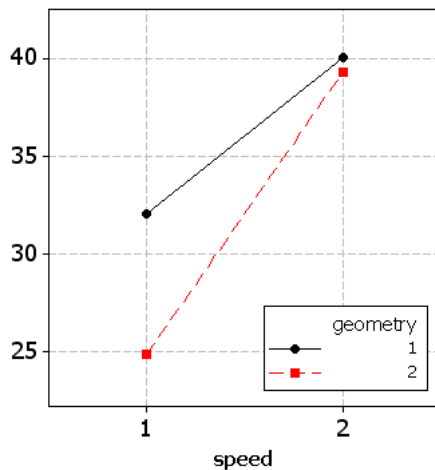
Analysis of Variance for y, using Adjusted SS for Tests						
Source	DF	SS	MS	F	P	
g	1	47.60	47.60	16.73	0.003	
s	1	379.69	379.69	133.46	0.000	
g*s	1	31.04	31.04	10.91	0.011	
Error	8	22.76	2.85	S = 1.6867		
Total	11	481.09				

(b)  $F_{interaction} = 10.91$  is significant:  $c_{0.95}(F_{1,8}) = 5.318$ ;  $P = 0.011$ .

The cell means are as follows

	LS	HS
#1	32.0	40.1
#2	24.8	39.3

The cell-mean plot is shown below. Both do better at high speed, but the effect of speed is greater for geometry #2 than for geometry #1.



(c)  $\bar{y}_{2H} = 39.3$ ,  $\bar{y}_{2S} = 24.8333$ ;  $est = 14.4667$ ,  $se = 1.6867\sqrt{\frac{1}{3} + \frac{1}{3}} = 1.3775$ .  
 95% CI for  $\mu_{2H} - \mu_{2S}$ :  $(14.4667 \pm 2.306 \times 1.3775) = (11.3, 17.6)$