

DESIGN AND DATA ANALYSIS IN PSYCHOLOGY II

JANUARY 2016, PARTIAL 2, TYPE A

EXERCISE 1

RAW SCORES: $\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_1 X_2 \rightarrow \hat{Y} = 140 + 30 X_1 + 0.25 X_2 + 0.7 X_1 X_2$

$$\hat{Y}_0 = \boxed{b_0} + \cancel{b_1 \cdot 1} + \boxed{b_2 X_2} + \cancel{b_3 \cdot 0 \cdot X_2}$$

$$\hat{Y}_0 = \boxed{140} + \boxed{0.25 X_2}$$

$$\hat{Y}_1 = \underbrace{\boxed{140 + b_1} \cdot 1}_{170} + \underbrace{\boxed{0.25} X_2 + \boxed{b_3} \cdot 1 \cdot X_2}_{0.95}$$

$$140 + b_1 = 170$$

$$b_1 = 170 - 140 = 30$$

$$0.25 + b_3 = 0.95$$

$$b_3 = 0.95 - 0.25 = 0.7$$

DIFFERENTIAL SCORES: $\hat{y} = b_1 x_1 + b_2 x_2 + b_3 x_1 x_2 \rightarrow \boxed{\hat{y} = 30 x_1 + 0.25 x_2 + 0.7 x_1 x_2}$

EXERCISE 2

$$SS_{\text{exp } X_1} = 50$$

$$SS_T = SS_{\text{exp}} + SS_{\text{res}} = 80 + 40 = 120$$

$$SS_{\text{exp } X_2} = 60$$

$$R^2 = \frac{SS_{\text{exp}}}{SS_T}$$

$$SS_{\text{exp } X_1, X_2} = 80$$

$$SS_{\text{res}} = 40$$

$$r^2_{Y_1} = \frac{50}{120} = 0.42$$

$$r^2_{Y_2} = \frac{60}{120} = 0.5$$

$$R^2_{Y(1,2)} = \frac{80}{120} = 0.67$$

$$R^2_{Y(1,2)} = \frac{80 - 60}{120} = \frac{20}{120} = 0.17$$

$$R^2_{Y(2,1)} = \frac{80 - 50}{120} = \frac{30}{120} = 0.25$$

EXERCISE 4

(a)

		SS	df	MS	F	sig
Model 1 (X_1)	REG	694'923	①	694'923	21'343	$F(\alpha, k, N-k-1) = F(0.05, 1, 16) = 4'49$ μ_0 $< 0'05$
	RES	520'964	16 ($N-k-1$)	32'56		
	TOTAL	1215'887	17 ($N-1$)			
Model 2 (X_1 and X_2)	REG	894'893	②	447'447	20'909	$F(\alpha, k, N-k-1) = F(0.05, 2, 15) = 3'68$ μ_0 $< 0'05$
	RES	320'994	15 ($N-k-1$)	21'4		
	TOTAL	1215'887	17 ($N-1$)			

$$R^2 = \frac{SS_{exp}}{SST} \rightarrow 0'736 = \frac{894'893}{SST}$$

$$0'736 \cdot SST = 894'893$$

$$SST = \frac{894'893}{0'736} = 1215'887$$

$$R^2 = \frac{SS_{exp}}{SST} \rightarrow 0'572 = \frac{SS_{exp}}{1215'887}$$

$$0'572 \cdot 1215'887 = SS_{exp}$$

$$694'923 = SS_{exp}$$

$$R^2 = 0'736^2 = 0'572$$

(b)

$$R^2_{Y(2.1)} = R^2_{Y.12} - R^2_{Y.1} = 0'736 - 0'572 = 0'164$$

$$R_{Y(2.1)} = \sqrt{0'164} = -0'406$$

↳ porque la correlación de X_2 con Y es negativa