Analysis of Covariance

Q.1. Jack and Jill each fit an Analysis of Covariance, relating post-trt score (Y) to treatment and pre-trt score (X). The overall pre-treatment mean score is $\bar{x}_{\bullet\bullet} = 25$ and there are r=5 subjects per treatment and no interaction.

Jack's Model: $y_{ij} = \mu_i + \beta\left(x_{ij} - \bar{x}_{\bullet\bullet}\right) + e_{ij} \quad i = 1,2,3 \quad j = 1,\ldots,5$

Jill's Model: $y_{ij} = \beta_0 + \beta_1 x_{ij} + \gamma_1 z_1 + \gamma_2 z_2 + e_{ij} \quad z_1 = \begin{cases} 1 & \text{if } i = 1 \\ 0 & \text{otherwise} \end{cases} \quad z_2 = \begin{cases} 1 & \text{if } i = 2 \\ 0 & \text{otherwise} \end{cases}$

	Jack's Beta		Jill's Beta	
	59.20	$\mu 1$	40.28	$\beta 0$
	54.83	$\mu 2$	0.33	$\beta 1$
	48.57	$\mu 3$	10.64	$\gamma 1$
	0.33	β	6.27	$\gamma 2$
Trt	1	2	3	overall
y-bar	58.38	54.83	49.40	54.20
x-bar	22.5	25	27.5	25

p.1.a. Show how Jack uses his model to obtain an estimate of Jill's $\beta_0 + \gamma_1$

p.1.b. Show how Jill uses her model to obtain an estimate of Jack's μ_3

p.1.c. Compute the adjusted means for each treatment.

Trt 1 _____ Trt 2 _____ Trt 3 _____