Problem 3

Part a

An investigator was interested in comparing the responses of rats to different doses of two drug products (A and B). The study called for a sample of 60 rats of a particular strain to be randomly allocated into two equal groups. The first group of rats was to receive drug A, with 10 rats randomly assigned to each of three doses (5, 10, and 20 mg). Similarly, the 30 rats in group 2 were to receive drug B, with 10 rats randomly assigned to the 5-, 10-, and 20-mg doses. In the study, each rat received its assigned dose, and after a 30-minute observation period, it was scored for signs of anxiety on a 0- to 30-point scale. Assume that a rat's anxiety score is a linear function of the dosage of the drug. Write a model relating a rat's scores to the two independent variables "drug product" and "drug dose." Interpret the βs.

Hint: The model is

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \varepsilon$$

Part b

The data for Part a is below:

The response of interest is an anxiety score obtained from trained investigators.

Use the data below in order to fit the model from Part a.

Drug	Drug Dose (mg)					
	5		10		20	
A	15	16	18	16	20	17
	16	15	17	15	19	18
	18	16	18	19	21	21
	13	17	19	18	18	20
	19	15	20	16	19	17
	av = 16		av = 17.6		av = 19.0	
B	16	15	19	18	24	23
	17	15	21	20	25	24
	18	18	22	21	23	22
	17	17	23	22	25	26
	15	16	20	19	25	24
	av = 16.4		av = 20.5		av = 24.1	

Of particular interest to the experimenter is a comparison between slopes of the regression lines. A difference in slopes would indicate that the drug products have different effects on the anxiety of the rats. Conduct a statistical test of the equality of the two slopes. (Use alpha .05)