

Exercise 3.3

We consider a chemical process where the yield is measured at three different temperatures ($40^\circ, 60^\circ, 80^\circ$, coded to $-1, 0, 1$) and using two different catalysts, A & B. The outcome is

Catalyst	Temperature		
	-1	0	1
A	U_1	U_2	U_3
B	V_1	V_2	V_3

We assume that we for each catalyst have a linear (affine) dependence between yield (outcome) and the operating temperature.

1. Formulate this as a general linear model and estimate the unknown parameters in the mean value expression.
2. Same question if we assume that the slopes for the two catalysts are the same.
3. Same question if we assume that we have the same temperature dependence for the two catalysts.
4. Same question if we assume that there is no temperature dependence.
5. Compare the residual sums of squares in the above cases if the actual observations were

Catalyst	Temperature		
	-1	0	1
A	3	4	5
B	3	2	7