MAT 458 Exam#2 04/17/20

1. A mechanical engineer is studying the thrust force developed by a drill press. He suspects that the drilling speed and feed rate are the most important factors. He uses four feed rates (0.0150.0300.0450.060), high (200) and low(125) drill speed. He obtains the following results.

	Feed Rate			
Drill Speed	0.015	0.030	0.045	0.060
125	2.70	2.45	2.60	2.75
	2.78	2.49	2.72	2.86
200	2.83	2.85	2.86	2.94
	2.86	2.80	2.87	2.88

Summary statistics are given below (the levels of speed coded as 1 an 2 respectively; the levels of rate coded as 1, 2, 3, 4 respectively).

		force	
Level of speed	n	Mean	Std Dev
1	8	2.66875000	0.14327172
2	8	2.86125000	0.04051014

		force	
Level of rate	n	Mean	Std Dev
1	4	2.79250000	0.06994045
2	4	2.64750000	0.20661962
3	4	2.76250000	0.12816006
4	4	2.85750000	0.07932003

speed	rate	LSMEAN
1	1	2.74000000
1	2	2.47000000
1	3	2.66000000
1	4	2.80500000
2	1	2.84500000
2	2	2.82500000
2	3	2.86500000
2	4	2.91000000

The ANOVA analysis gave the following output

Source	DF	Sum of Squares	Mean Square	F	P_{value}
Model	7	0.28260000	0.04037143	15.53	0.0005
Error	8	0.02080000	0.00260000		
Total	15	0.30340000			

Source	DF	Type I SS	Mean Square	F	P_{value}	
speed	1	0.14822500	0.14822500	57.01	$< .0001$	
rate	3	0.09250000	0.03083333	11.86	0.0026	
spee*rate	*	**********	*********	****	*****	

Note that some values in the output are missing.