2024 Spring – SPC&O HW#15

1. Use a 2^{6-p} fractional factorial design with Resolution V to design a 6-factor CCD experiment with 2 center points. To minimize the number of the experimental tests, what would be p? How many experimental tests are required for this CCD design? Design a 6-factor BBD experiment and compare it with the CCD.

2. The data of the following central composite design table were collected by a chemical engineer. The response y is filtration time, x_1 is temperature, and x_2 is pressure. Fit a second-order model.
   (a) What operating conditions would you recommend if the objective is to minimize the filtration time?
   (b) What operating conditions would you recommend if the objective is to operate the process at a mean filtration rate very close to 46?

x_1	x_2	y
-1	-1	54
-1	1	45
1	-1	32
1	1	47
-1.414	0	50
1.414	0	53
0	-1.414	47
0	1.414	51
0	0	41
0	0	39
0	0	44
0	0	42
0	0	40