# Blocking in a 2^k Factorial Design

*Submit a Word/PDF document in response to this assignment. Copy and paste graphs from R into this document, i.e. create these in a script but do not use RMarkdown.*

An engineer is interested in the effects of cutting speed A, tool geometry B, and cutting angle C on the life (in hours) of a machine tool. Two levels of each factor are chosen, and one replicate of a 23 factorial design is run:

1. Assume that the design is run in two blocks.
2. Which effect(s) would you confound with the blocks?
3. Propose a design (i.e. assign corner points to blocks)
4. Assume the design is to be run in four blocks.
5. Which effects would you confound with the blocks?
6. Propose a design (i.e. assign corner points to blocks)

The following data was collected for the design that you proposed in question 1(b):

| ***A*** | ***B*** | ***C*** | **Treatment**  **Combination** | **Tool Life**  **(hrs)** |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| − | − | − | (1) | 22 |  |  |  |  |
| + | − | − | *a* | 32 |  |  |  |  |
| − | + | − | *b* | 35 |  |  |  |  |
| + | + | − | *ab* | 55 |  |  |  |  |
| − | − | + | *c* | 44 |  |  |  |  |
| + | − | + | *ac* | 40 |  |  |  |  |
| − | + | + | *bc* | 60 |  |  |  |  |
| + | + | + | *abc* | 39 |  |  |  |  |

1. Generate a half normal plot for the collected data
2. Which effects appear to be significant?
3. Does it appear that the block was significant?