Problem (VI) contd:

(6) Create a quarter fraction design from the above design.

- There is no way for us to create a meaningful 1/4 design if we are creating it by taking a subset of 8 runs from our original 1/2 fraction design. There will be no defining contrast we can select s.t. our design will have resolution III or greater, so we will always have main effects confounded w/ other main effects. Recall that the resolution of a design is equal to the number of factors included in the smallest generator (either implicit or defining). In our case, we have 5 factors, and we are given our first defining generator $I = -ABCDE \Leftrightarrow E = -ABCD$. For the 1/4 design we need another defining generator. If we use something w/ less than 3 factors say $I = AC$, then already our resolution is less than 3 and some of our main effects would be confounded. If we choose a defining generator using 3 factors, say ABC, then our implicit generator would be $-ABCDE \cdot ABC = -DE$. Thus the main effects of DE would be confounded. Similarly, if we chose a defining generator using 4 factors, then our smallest generator would contain only 1 factor ⇒ our design is of resolution I.

- In order to construct a 1/4 design of any real value (Resolution III or higher) we would have to change our original defining generator from $I = -ABCDE$ to something like ABD. Then our second generator could be ACE and our resulting design would be Resolution III.