# Factorial Designs

*Do the following problem by hand showing all calculations (R may only be used to find critical values and support calculations). Upload a scan/pdf to Blackboard.*

An article in the *IEEE Transactions on Electron Devices* (Nov. 1986, pp. 1754) describes a study on polysilicon doping. The experiment shown below is a variation of their study. The response variable is base current. Do the calculations by hand

|  | **Anneal Temperature (°C)** | | |
| --- | --- | --- | --- |
| **Polysilicon Doping (ions)** | **900** | **950** | **1000** |
| 1 × 1020 | 4.60 | 10.15 | 11.01 |  |
|  | 4.40 | 10.20 | 10.58 |  |
| 2 × 1020 | 3.20 | 9.38 | 10.81 |  |
|  | 3.50 | 10.02 | 10.60 |  |

1. Write the model equation (assuming fixed effects)
2. How many replicates of the design are there?
3. Write the ANOVA table for this 2x3 factorial design
4. Assuming the assumptions of ANOVA are met, test for an interaction between temperature and doping at α=0.10. Write the hypothesis and state conclusions.
5. Sketch by hand an interaction plot between temperature and doping