

Homework 1

- In the following table, “S” represents the standard setting and “M” represents the modified setting in an experiment studying the effect of three factors (A, B and C) on the lifetime of ball bearings under accelerated testing. Which 4 runs would be used in a one-at-a-time design? Would the one-at-a-time design fail to detect any experimental effects that a full factorial design would detect? Use a cube plot to help in answering this question.

Factor settings	Response (hrs)
(S,S,S)	17
(M,S,S)	26
(S,M,S)	25
(M,M,S)	85
(S,S,M)	19
(M,S,M)	16
(S,M,M)	21
(M,M,M)	128

- In the following table, the effect of three factors (Adhesive Type, Conductor Material and Post Coating) upon the bonding strength of an integrated circuit board was tested. Each combination of factors was replicated 5 times. Based on the *variation* observed for each factor setting, which factors seem to affect variation? Which settings result in the least variation? You can use graphic aids such as boxplots or numerical summaries such as the range, standard deviation or variance, to help you with this question.

Factor settings	Response (psi)
(D2A,Cu,Tin)	73.0,73.2,72.8,72.2,76.2
(D2A,Cu,Silver)	87.7,86.4,86.9,87.9,86.4
(D2A,Ni,Silver)	80.5,81.4,82.6,81.3,82.1
(D2A,Ni,Tin)	79.8,77.8,81.3,79.8,78.2
(H-1-E,Cu,Silver)	85.2,85.0,80.4,85.2,83.6
(H-1-E,Cu,Tin)	78.0,75.5,83.1,81.2,79.9
(H-1-E,Ni,Tin)	78.4,72.8,80.5,78.4,67.9
(H-1-E,Ni,Silver)	90.2,87.4,92.9,90.0,91.1