

### Homework 3

1. In the following replicated experiment, the amount of inert gas (radon, xenon) adsorbed by activated charcoal was studied as a function of temperature (25°C, 55°C) and humidity (5%, 25%).

Factor settings	Adsorption Coefficient
(Xenon,25,5)	730,770,720
(Radon,25,5)	540,530,500
(Xenon,55,5)	320,340,350
(Radon,55,5)	210,230,230
(Xenon,25,25)	340,340,370
(Radon,25,25)	110,100,120
(Xenon,55,25)	90,90,70
(Radon,55,25)	50,10,40

- (a) Construct a normal probability plot of the effects using the average responses. Discuss and analyze your results.
  - (b) Analyze results using T-tests (Use the 97.5 percentile to find a T critical value). Confirm your hand calculations using Minitab. Compare results to your earlier analysis.
2. Suppose that for the above experiment you want to be able to detect a factor effect of 30 with 95% confidence.
    - (a) Using the non-significant effects, estimate  $\sigma$ . Compare this estimator to the square root of MSPE. Are they close? Which method of estimating  $\sigma$  do you prefer?
    - (b) Using both estimates of  $\sigma$  from above, how many replicates are needed to detect a factor effect of 30?