ME 794 - Statistical Design of Experiments

Tutorial 2

Comparative Experiments -II (Chi-square test) and Analysis of Variance [Ungraded]

Section 1: *Chi-square test problem*

1. Four observations on etch uniformity on silicon wafers are taken during a qualification experiment for a plasma etcher. The data are as follows:

   6.00 7.25 5.25 6.50

   Test the hypothesis that $\sigma^2 = 1.25$. Use $\alpha = 0.05$. Will you accept the hypotheses?

---x---x---

Section 2: *Analysis of Variance*

1. The tensile strength of Portland cement is being studied. Four different mixing techniques can be used economically. A completely random experiment was conducted, and the following data were collected:

Mixing Technique	**Tensile Strength (lb/in2)**		
1	3000	3030	2850
2	3300	3300	3150
3	2850	2880	3000
4	2700	2700	2700

For the given data complete the following table **[11 marks]**

Source of Variation	**Sum of Squares**	**Degrees of Freedom**	**Mean Square**	**F_0**
Between Treatments				
Error (Within Treatments)				
Total				

2. A pharmaceutical manufacturer wants to investigate the bioactivity of a new drug. A completely randomized single-factor experiment was conducted with three dosage levels, and the following results were obtained.

Dosage	**Observations**			
20 g	24	28	37	30
30 g	37	44	31	35
40 g	42	47	52	38

   a. Is there evidence to indicate that dosage level affects bioactivity? Use $\alpha = 0.05$.