ENGR 0020 PROB & STAT FOR ENGINEERS I

Recitation 11

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Office Hour: Thursday 2:00 – 3:00pm, 1023 Benedum Hall

Goals:

1. To help to understand the lecture and homework questions.
2. To take quizzes for getting the feedback of the class. The quizzes will take 10 mins at the end of recitation.

1. **(Linear Regression; Goodness of fit; Significance test)** In a certain type of metal test specimen, the normal stress on a specimen is known to be functionally related to the shear resistance. The following is a set of coded experimental data on the two variables:

Normal Stress, x	Shear Resistance, y
26.8	26.6
25.4	27.3
28.9	24.2
23.6	27.1
27.7	23.6
23.9	25.9
24.7	26.3
28.1	22.5
26.9	21.7
27.4	21.4
22.6	25.8
25.6	24.9

   In the last recitation, we have known $S_{xx} = 43.0467, S_{yy} = 47.1467, S_{xy} = -29.5333$ and the linear regression line $\hat{y} = 42.582 - 0.6861x$.

   (a) Compute the coefficient of determination and discuss the quality of fit.

   (b) Determine if the normal stress influence the shear resistance in the linear regression model.

2. **(Simple Linear Regression; Matlab)** Show how to use Matlab to determine the regression line and analyze the result.

   - www.mathworks.com/help/stats/linear-regression-model-workflow.html

3. **(ANOVA, Matlab; Exercise 13.4, p519)** Immobilization of free-ranging white-tailed deer by drugs allows researchers the opportunity to closely examine the deer and gather valuable physiological information. In the study *Influence of Physical Restraint and Restraint Facilitating Drugs on Blood Measurements of White-Tailed Deer and Other Selected Mamals*, conducted at Virginia Tech, wildlife biologists tested the "knockdown" time (time from injection to immobilization) of three different immobilizing drugs. Immobilization, in this case, is defined as the point where the animal no longer has enough muscle control to remain standing. Thirty male white-tailed deer were randomly assigned to each of three treatments. Group A received 5 milligrams of liquid succinylcholine chloride(SCC); Group B received 8 milligrams of powdered SCC; and group C received 200 milligrams of phencyclidine hydrochloride. Knockdown times, in minutes, were recorded. **Perform an analysis of variance at the 0.05 level of significance and determine whether or not the average knockdown time for the three drugs is the same.**

   - `https://www.mathworks.com/help/stats/one-way-anova.html`

Source	SS	df	MS	F	Prob>F
Columns	158.867	2	79.4333	5.46	0.0102
Error	393	27	14.5556		
Total	551.867	29			

Table

A	B	C
11	10	4
5	7	4
14	16	6
7	7	3
10	7	5
7	5	6
23	10	8
4	10	3
11	6	7
11	12	3