

**Instructions:** Show all work. Use exact answers or appropriate rounding conventions. If you use your calculator, you can show work by saying which calculator commands you used.

1. Axial stiffness data is tested using an ANOVA test and produced the following output from a statistical software package.

**Analysis of Variance for Stiffness**

| Source | DF | SS    | MS    | F | P |
|--------|----|-------|-------|---|---|
| Length | 4  | 43993 | 10998 |   |   |
| Error  | 30 | 31475 | 1049  |   |   |
| Total  | 34 | 75468 |       |   |   |

| Level | N | Mean   | StDev |
|-------|---|--------|-------|
| 4     | 7 | 333.21 | 36.59 |
| 6     | 7 | 368.06 | 28.57 |
| 8     | 7 | 375.13 | 20.83 |
| 10    | 7 | 407.36 | 44.51 |
| 12    | 7 | 437.17 | 26.00 |

Pooled StDev = 32.39

- a. Use the table to determine the missing F test statistic and the corresponding P-value.

$$F = \frac{MSTr}{MSE} = \frac{10998}{1049} = 10.484$$

$$P = 1.956 \times 10^{-5} < .05$$

$$F_{cdf}(10.484, 4, 30) = 1.956 \times 10^{-5}$$

I-1    I(J-1)

- b. Use the information provided to conduct Tukey's procedure on the data. Use the underscoring procedure to illustrate the differences in the five categories.

$$Q_{.05, 4, 30} = 3.85$$

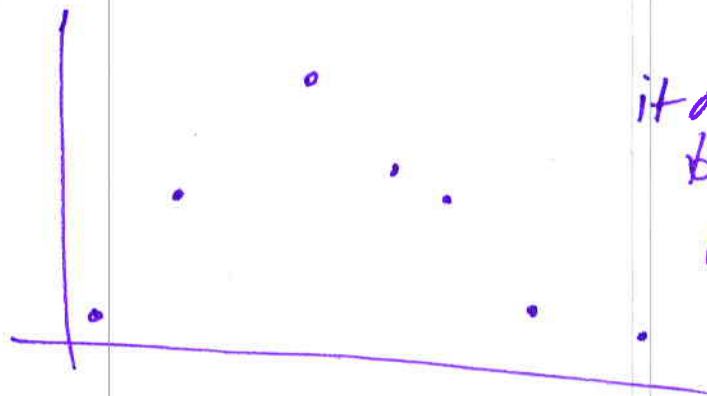
$$W = Q \sqrt{MSE/J} = 3.85 \sqrt{1049/7} = 47.13$$



2. An article measured the stretchiness of cheese and how it varied by temperature. The following data gives  $x$ =temperature and  $y$ =elongation percentage.

|   |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|
| x | 59  | 63  | 68  | 72  | 74  | 78  | 83  |
| y | 118 | 182 | 247 | 208 | 197 | 135 | 132 |

Construct a scatterplot of data and sketch it here. Is the data suggestive of a linear relationship between temperature and elongation?



it does not appear  
to be linear  
possibly quadratic  
or cubic

3. Find the linear regression line and correlation coefficient for the data below.

|   |     |     |     |     |     |      |
|---|-----|-----|-----|-----|-----|------|
| x | 14  | 18  | 40  | 43  | 45  | 112  |
| y | 280 | 350 | 470 | 500 | 560 | 1200 |

$$y = 9.31x + 137.86$$

$$r = .9948$$

4. Find the confidence interval for  $\beta_1$  for the data in question #3.

Lin Reg T Int

$$(7.994, 10.629) \quad 95\%$$

$$(7.1267, 11.496) \quad 99\%$$