

1. A manager wishes to determine whether the mean times required to complete a certain task differ for the three levels of employee training. He randomly selected 10 employees with each of the three levels of training (Beginner, Intermediate and Advanced). Do the data provide sufficient evidence to indicate that the mean times required to complete a certain task differ for at least two of the three levels of training? The data is summarized in the table. $\alpha=0.05$.

Level of Training	n_i	\bar{x}_i	s_i^2
Advanced	10	24.2	21.54
Intermediate	10	27.1	18.64
Beginner	10	30.2	17.76

a. Write down null and alternative hypotheses.

b. Please finish the following calculations and fill in the following ANOVA table

$$SST = \sum n_i (\bar{x}_i - \bar{x})^2 =$$

$$MST = \frac{SST}{k-1} =$$

$$SSE = \sum (n_i - 1) s_i^2 =$$

$$MSE = \frac{SSE}{n-k} =$$

$$F = \frac{MST}{MSE} =$$

Source of variation	Sum of Squares	Degree of freedom	Mean square	Fvalue
Between Groups				
Within Groups				
Total				

- c. Given $F \geq F_{0.05, 2, 27} = 3.35$, state the conclusion of the ANOVA F-test in the context of this problem.

2. A carcinogenicity study was conducted to examine the tumor potential of a drug product scheduled for initial testing in humans. A total of 300 rats (150 males and 150 females) were studied for a 6 month period. At the beginning of the study, 100 rats (50 males and 50 females) were randomly assigned to the control group, 100 to the low-dose group, and the remaining 100 to the high-dose group. One each day of the 6-month period, the rats in the control group received an injection of an inert solutions, whereas those in the treatment groups received an injection of the solution plus drug. The sample data are shown in the accompanying table.

	Number of Tumors	
Rat group	One or more	none
Control	10	90
Low dose	14	86
High dose	19	81

- Give the percentage of rats with one or more tumors for each of the three treatment groups.
- Conduct a test of whether there is significant difference in the proportion of rats having one or more tumors for the three treatment groups with $\alpha=0.05$.