

A construction engineer has designed an experiment to investigate three different types of pressure treatment that can be applied to raw lumber. Nine pieces of lumber were randomly assigned to each pressure treatment. After treatment, each piece of lumber was tested for water repellency. Low scores on the water repellency measure indicate better repellency than do high scores. Selected statistics are reported below.

Treatment	Sample Size	Sample Mean
I	9	51
II	9	60
III	9	48

- (a) Complete the ANOVA table (2 pts for each entry)
- (b) Give a point estimate for σ (2 pts)
- (c) Give the critical value of the F statistic and test the hypothesis $H_0: \mu_1 = \mu_2 = \mu_3$ at $\alpha = 0.05$. (3 pts)
- (d) Use Tukey-Kramer 95% confidence intervals to determine which, if any, means are significantly different. Show all work. (7 pts)
- (e) What proportion of the variability among the repellency measures is explained by their relationship to the type of pressure treatment? (3 pts)

Source	Sum of Squares	df	Mean Square	F
Pressure Treatments	_____	_____	_____	_____
Error	2,112	_____	_____	
Total	_____	_____		

A simple linear regression model was fit to data concerned with eruptions of Old Faithful. The response was the duration of the eruption (in minutes) and the explanatory variable was the waiting time since the last eruption (in minutes). The sample mean of waiting time is $\bar{x} = 70.9$ minutes and the sample variance of waiting time is $s_x^2 = 184.96$. Rweb output appears below:

Residuals:

	Min	1Q	Median	3Q	Max
	-1.29917	-0.37689	0.03508	0.34909	1.19329

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.874016	0.160143	-11.70	<2e-16
waiting	0.075628	0.002219	34.09	<2e-16

Residual standard error: 0.4965 on 270 degrees of freedom

Multiple R-Squared: 0.8115, Adjusted R-squared: 0.8108

F-statistic: 1162 on 1 and 270 degrees of freedom, p-value: 0

- (a) Give point estimates for α , β , and σ . (4 pts)
- (b) Estimate the mean eruption duration when waiting time is one hour. (3 pts)
- (c) Predict the value of y when waiting time is one hour. (3 pts)
- (d) Compute a 95% confidence interval for the mean eruption duration when waiting time is one hour. Show all work. (7 pts)