# Application exercise: 4.2 ANOVA - Part 1

Teacher evaluations

Many college courses conclude by giving students the opportunity to evaluate the course and the instructor anonymously. In this application exercise we evaluate whether the teaching evaluations for instructors vary by their rank: teaching, tenure track, and tenured. Note that the instructors are evaluated on a 1-5 scale (1-low, 5-high).

The data come from "Beauty in the classroom: instructors' pulchritude and putative pedagogical productivity" (Hamermesh and Parker, 2005) found that instructors who are viewed to be better looking receive higher instructional ratings.[1], which is a dataset we will work with again later in the course.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	Std. Dev.	n
teaching	3.300	3.900	4.400	4.284	4.700	5.000	0.5	102
tenure track	2.300	3.700	4.350	4.155	4.600	4.900	0.56	108
tenured	2.400	3.800	4.200	4.139	4.600	5.000	0.55	253
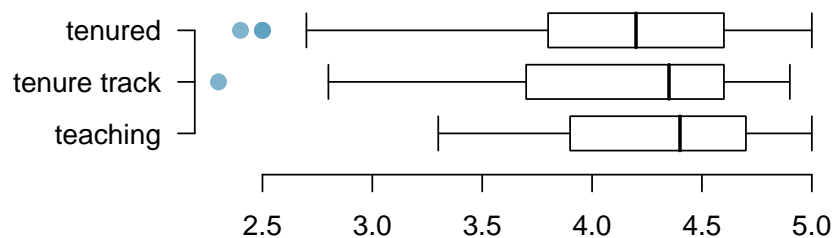
1. What is the response and what is the explanatory variable in the ANOVA?

2. State the hypotheses for evaluating whether the average evaluation score varies by rank.

3. Check the conditions for evaluating these hypotheses.

4. Below is a partial ANOVA table. Fill in the blanks. *Hint:* Not all blanks in the table need to be filled, you need to decide which blanks need to be filled.

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
evals$rank		1.59			
Residuals					
Total		136.66			

5. Determine the conclusion of the hypothesis test at $\sigma = 0.10$.

6. Explain what the sum of squares associated with rank (also called SS_{group}) and sum of squares associated with the residuals (also called SS_{error}) and the total sum of squares mean. You are not being asked to calculate these numbers, only to explain what they mean in context of the data.

[1]Daniel S. Hamermesh, Amy Parker, Beauty in the classroom: instructors pulchritude and putative pedagogical productivity, *Economics of Education Review*, Volume 24, Issue 4, August 2005, Pages 369-376, ISSN 0272-7757, 10.1016/j.econedurev.2004.07.013. (http://www.sciencedirect.com/science/article/pii/S0272775704001165).