

Part I. (80 points) Do all calculations in SAS. Use a word processor of your choice to write a report. Insert computer text output and graphics to support what you are saying, but you need to write something that looks like an academic paper — not a pile of computer output. Turn in a hard copy of your HW in class (i.e., don't email me your HW). Also:

1. Clearly specify parameters and hypotheses when appropriate.
2. Write a coherent conclusion.

(80^{pts})

1. Faculty political tolerances:

A political scientist developed a questionnaire to determine political tolerance scores (Y) for a random sample of faculty members at her university. She wanted to compare mean scores adjusted for the age (X) for each of the three categories: full professors (coded 1), associate professors (coded 2), and assistant professors (coded 3). The data are given below. Note the higher the score Y, the more tolerant the individual.

Y	X	Rank	Y	X	Rank	Y	X	Rank
3.03	65	1	4.62	34	2	5.20	26	3
4.31	47	1	4.85	30	2	4.61	48	3
5.09	49	1	5.12	49	2	4.47	25	3
3.71	41	1	4.50	42	2	4.77	42	3
5.29	40	1	5.17	39	2	3.67	31	3
2.70	61	1	5.22	31	2	5.86	33	3
2.70	52	1	4.51	35	2	4.55	32	3
4.02	45	1	4.47	31	2	5.71	33	3
5.52	41	1	4.88	43	2	5.82	30	3
4.62	39	1	5.21	49	2	5.29	27	3

We are interested in building a model to assess the dependence of tolerance on age and rank.

- (a) (10 pts) Plot tolerance against age, using rank as a plotting symbol. Describe how tolerance depends on age within ranks.
- (b) (15 pts) Create indicators for full and associate professors, so that assistant professors serve as the reference group. Starting with a model that allows each rank to have its own intercept and slope, test whether the slopes are equal. If the hypothesis of equal slopes is plausible, fit the model of equal slopes and test whether intercepts are equal.
- (c) (5 pts) Given the tests in the previous part, which of the models considered is “best.”
- (d) (10 pts) Given the “best model” provide equations for the predicted tolerance as a function of age. Give 1 prediction equation for each rank.
- (e) (10 pts) Graph the predicted tolerances as a function of age, making sure to distinguish among ranks, if necessary.
- (f) (10 pts) Quantify, as best as possible, the effect of rank on tolerance, after adjusting for age.
- (g) (20 pts) Provide any additional analysis that you feel is needed. Write a short summary of your findings.

80 pts

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