

STATISTICS Ph.D. QUALIFYING EXAM: TAKE HOME
Due 2 PM Fri. August 11, 2005. Return to Donna George in the Dept Office

Directions: The exam has one problem. Your answer should be word-processed, double spaced, and should be no longer than five pages. An appendix is allowed but will be examined only at the discretion of the graders. The better constructed your appendix, the more likely it is to get examined. Please use your ID number (last 4 digits of your Social Security Number) for identification. Do not put your name on the exam. All work is to be your own - you are not permitted to speak to any other students about any aspect of this exam.

The data in this example were collected from the personnel files of faculty at a small college in the 1970s. The data were collected to assess whether women were being discriminated against (consciously or unconsciously) in salary. The sample consists of tenured and tenure-stream faculty only. Temporary faculty were excluded from consideration.

From left to right, the variables in the data set (a subset of which is given below) are id (individual identification numbers from 1 to 52), sex (coded 1 for female and 0 for male), rank (coded 1 for Asst. Professor, 2 for Assoc. Professor and 3 for Full Professor), year (number of years in current rank), degree (coded 1 for Doctorate, 0 else), yd (number of years since highest degree was earned), and salary (academic year salary in dollars).

The data includes 5 features that may be useful for predicting salary: sex, rank, degree, year, and yd. A primary statistical interest is whether males and females are compensated “equally”, and whether any effect due to sex is the same for each rank, or not. Provide an analysis of these data that addresses these issues, and quantifies the effect, if any, of sex on salary. Discuss your findings, and any potential limitations of your analysis.

1	0	3	25	1	35	36350
2	0	3	13	1	22	35350
3	0	3	10	1	23	28200
4	1	3	7	1	27	26775
5	0	3	19	0	30	33696
6	0	3	16	1	21	28516
7	1	3	0	0	32	24900
8	0	3	16	1	18	31909
9	0	3	13	0	30	31850
10	0	3	13	0	31	32850

An EXCEL spreadsheet with the data can be found on the WWW at

<http://www.stat.unm.edu/~bedrick/salary.xls>.