

**AP Statistics
Assignment 2-10**

Be sure to show your thinking and understanding.

1) The Berkeley Graduate Admissions Study

In the Fall of 1973, an observational study on possible gender bias was conducted at the University of California, Berkeley. In that year, there were 12,763 applicants for graduate admission; the following is a two-way table that gives the data according to the variables *outcome* (admitted or denied) and *gender* (male or female).

	Admitted	Denied
Male	3738	4704
Female	1494	2827

Of course, it's hard to draw any conclusions about the question of gender bias from this table, because different numbers of men and women applied for graduate admission. Clearly, we should work with percentages instead.

- a) Construct a two-way table that gives the percentages of men admitted and denied, and the percentages of women admitted and denied.

%	Admitted	Denied
Male		
Female		

From your table in Exercise 1, you should have observed that approximately 44% of men were admitted, but only about 35% of women were admitted.

- b) Do you believe that there was gender bias in graduate admissions at UC Berkeley in 1973?

<type answer here>

- c) Can you think of possible causes for the discrepancy in admission rates other than gender bias?

<type answer here>

One factor that you probably thought of in the last exercise was the *qualification* of the applicants. Naturally, a discrepancy in admission rates could result if the women, as a group, were less qualified than the men, in terms of college grades or standardized tests. In fact, however, there was no significant difference between the qualifications of the men and the women, as groups.

- d) In light of this information, answer questions b and c again.

<type answer here>

Let us now introduce a new variable that may help explain the data. At UC Berkeley, as in most universities, decisions about graduate admission are made at the *department* level. In 1973, UC Berkeley had 101 different graduate departments, but for simplicity, we will consider only the six largest departments (which collectively account for 4486 of the applicants). The following table is a *three-way table* that presents the admissions data according to the variables *department* (A, B, C, D, E, F), *gender* (male, female), and *outcome* (admitted, denied). The table is adapted from data in reference [2].

	Male		Female	
	Admitted	Denied	Admitted	Denied
A	512	313	89	19
B	313	207	17	8
C	120	205	202	391
D	138	279	131	244
E	53	138	94	299

F	22	351	24	317
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- e) Once again, construct the three-way table that gives the percentages of men admitted and denied, and the percentages of women admitted and denied for each department.

	Male		Female	
	Admitted	Denied	Admitted	Denied
A				
B				
C				
D				
E				
F				

- f) Construct the two way table (both with counts and percentages) for the variables *outcome* and *gender*. Sketch the corresponding histogram.

Count	Admitted	Denied
Male		
Female		

%	Admitted	Denied
Male		
Female		

- g) Construct the two way table (both with counts and percentages) for the variables *outcome* and *department*. Sketch the corresponding histogram.

Count	Admitted	Denied
A		

B		
C		
D		
E		
F		

%	Admitted	Denied
A		
B		
C		
D		
E		
F		

- h) Construct the two-way table (both with counts and percentages) for the variables *gender* and *department*. Sketch the corresponding histogram.

Count	Male	Female
A		
B		
C		
D		
E		
F		

%	Male	Female
A		
B		
C		
D		

E		
F		

- i) Based on your analysis, do you now believe that there was gender bias in graduate admissions at the University of California at Berkeley in 1973?

<type answer here>

- 2) A group of college students believes that herbal tea has remarkable powers. To test this belief, they make weekly visits to a local nursing home, where they visit with the residents and serve them herbal tea. The nursing home staff reports that after several months many of the residents are more cheerful and healthy. A skeptical sociologist commends the students for their good deeds but scoffs at the idea that herbal tea helped the residents.

- a) Identify the explanatory and response variables in this informal study.

<type answer here>

- b) Identify the lurking variables and explain what they may have accounted for in the observed association.

<type answer here>

- 3) A study shows that there is a positive correlation between the size of a hospital and the median number of days that patients remain in the hospital. Does this mean that you can shorten a hospital stay by choosing a small hospital? Explain your response.

<type answer here>

- 4) A newspaper claims, "There is a strong positive correlation between the number of firefighters at a fire and the amount of damage the fire does. So sending lots of firefighters just causes more damage." Explain why this reasoning is wrong.

<type answer here>

- 5) A study of elementary age school children (aged 5 to 11) finds a strong positive correlation between weight and reading comprehension. Therefore, we should start feeding elementary age school children as much as possible in order to increase their reading comprehension. Explain what is wrong with this thinking and a more appropriate conclusion.

<type answer here>

- 6) Children who watch many hours of television get lower grades in school on the average than those who watch less TV. Explain clearly why this fact does not show that watching TV *causes* poor grades. Identify some alternate possibilities for the association.

<type answer here>