

STATISTICS QUALIFYING EXAM - TAKE HOME

Due 1PM Friday January 17, 1997. Return to E. Bedrick HUM 470

Directions: The answer to each problem should be typed (i.e. word-processed), double spaced, and should be no longer than three pages. An appendix is allowed for each problem but will be examined only at the discretion of the graders. The better constructed your appendix, the more likely it is to get examined. (use your exam id # !)

1. The data on the next page contain information on the AGE, SEX (Male=1, Female=2), work problems index (WP), marital conflict index (MC) and a depression index (DEP) for a sample of 39 new admissions to a psychiatric clinic at a large university hospital. WP, MC, and DEP are measured on a roughly continuous scale, with larger values indicating a more severe problem.

Researchers at the hospital are interested in the factors that are related to DEP, and whether the relationship between DEP and these factors is similar, or different for males and females. Build a regression model, or models, to answer these questions. Succinctly summarize your findings.

ID NO.	AGE	SEX	WP	MC	DEP
1	45	2	90	70	69
2	35	1	90	75	75
3	32	2	70	32	35
4	32	2	80	30	73
5	39	2	85	55	86
6	25	2	85	6	161
7	22	1	75	20	202
8	30	2	70	63	91
9	49	2	75	4	113
10	47	1	84	12	68
11	48	1	64	11	109
12	49	2	85	7	92
13	45	2	80	8	80
14	41	2	80	15	82
15	45	2	82	6	156
16	59	2	72	5	198
17	42	2	70	17	170
18	35	1	70	29	188
19	31	2	70	80	82
20	45	1	70	126	37
21	28	1	85	30	194
22	37	1	90	9	294
23	29	1	80	14	94
24	29	1	70	24	126
25	31	1	80	21	192
26	29	1	60	11	232
27	29	1	70	10	184
28	23	2	80	10	238
29	44	2	78	19	112
30	28	1	70	22	141
31	32	2	70	21	108
32	36	2	74	77	87
33	22	2	78	67	33
34	46	2	70	25	73
35	21	1	70	14	168
36	34	1	80	17	218
37	27	2	80	18	175
38	31	2	80	42	126
39	19	2	75	36	135

2. In an experiment on the preparation of chocolate cakes, 3 recipes for the batter were compared. Recipes I and II differed in that the chocolate was added at 40 degrees Celsius and 60 degrees Celsius, respectively, while recipe 3 contained extra sugar. Six different baking temperatures, ranging from 175 to 225 degrees Celsius were tested with each recipe. Each time that a mix was made by any recipe, enough batter was prepared for 6 cakes, each of which was baked at a different temperature. There were 10 replications conducted over time.

A number of measurements were made on the cakes. The data in the following table give the breaking angles. One half of a slab of cake is held fixed, while the other half is pivoted about the middle until breakage occurs. The angle through which the moving half has revolved is read on a circular scale.

Analyze the data, quantifying the differences among recipes, and the impact of temperature on the breaking angle.

BREAKING ANGLES (DEGREES)

		Temperature					
	Rep.	175°	185°	195°	205°	215°	225°
Recipe I	1	42	46	47	39	53	42
	2	47	29	35	47	57	45
	3	32	32	37	43	45	45
	4	26	32	35	24	39	26
	5	28	30	31	37	41	47
	6	24	22	22	29	35	26
	7	26	23	25	27	33	35
	8	24	33	23	32	31	34
	9	24	27	28	33	34	23
	10	24	33	27	31	30	33
Recipe II	1	39	46	51	49	55	42
	2	35	46	47	39	52	61
	3	34	30	42	35	42	35
	4	25	26	28	46	37	37
	5	31	30	29	35	40	36
	6	24	29	29	29	24	35
	7	22	25	26	26	29	36
	8	26	23	24	31	27	37
	9	27	26	32	28	32	33
	10	21	24	24	27	37	30
Recipe III	1	46	44	45	46	48	63
	2	43	43	43	46	47	58
	3	33	24	40	37	41	38
	4	38	41	38	30	36	35
	5	21	25	31	35	33	23
	6	24	33	30	30	37	35
	7	20	21	31	24	30	33
	8	24	23	21	24	21	35
	9	24	18	21	26	28	28
	10	26	28	27	27	35	35