

## Statistical Methods in Psychology

Psychology 302

Winter, 1985

Text: Welkowitz, Ewen, & Cohen, *Introductory Statistics for the Behavioral Sciences*. Academic Press (3rd Edition).

### Tentative Schedule

Week	Readings	Examinations
Jan 9–Jan 11	Chapters 1 & 2	
Jan 14–Jan 18	Chapters 3 & 4	
Jan 21–Jan 25	Chapters 5, 6 & 7	
Jan 28–Feb 1	Chapters 8 & 9	
Feb 4–Feb 8	Chapter 10	Exam #1, Monday Feb. 4 (Ch. 1–9)
Feb 11–Feb 15	Chapter 11	
Feb 18–Feb 22	Chapter 12	
Feb 25–Mar 1	Chapter 13	Exam # 2, Monday Feb 25 (Ch. 10–12)
Mar 4–Mar 8	Chapters 15 & 16	
Mar 11–Mar 15	Chapter 17	
Exam Week:	Final Exam, 3:15 p.m., Tuesday March 19 (Ch. 1–13 & 15–17)	

**Examinations:** Exams #1 and #2 will be 50–min. *closed book* exams. The final will be a 2–hour *open book* exam. Calculators are recommended for all exams. However, you cannot have a fancy statistical calculator do all your work for you. To receive credit for an answer to a non–trivial problem, you must show each step of your calculations on the exam.

**Homework:** There will be weekly homework assignments. Generally, these will be handed out on Friday and will be due in lab the next Thursday or Friday. Late assignments will not be accepted.

**Laboratories:** These sessions will be conducted by the teaching assistant. He will collect and return homework, discuss homework and exams, and explain material from the text and lectures.

**Grading:** Final grades will be based on homework and exams, given approximately the following percentage weights: Homework, 20%, Exam #1, 20%, Exam #2, 20% Final exam, 40%.

#### Office Hours:

<b>Name:</b>	Douglas Hintzman (Instructor)	Peter Frohman (TA)
<b>Office:</b>	307 Straub	474 Straub
<b>Phone:</b>	4906	4954
<b>Hours:</b>	Tuesday, 2–4; Thursday, 10–11:30; or by appointment.	To be announced.

You will need several sheets of graph paper. On all homework assignments, where calculations are required, always show your work.

1. Professor Ratrunner has just given an exam in her introductory psychology class. She makes up a frequency distribution, which is shown at right.
- | Score  | f  |
|--------|----|
| 96-100 | 20 |
| 91-95  | 16 |
| 86-90  | 8  |
| 81-85  | 10 |
| 76-80  | 3  |
| 71-75  | 1  |
- (a) Plot a frequency histogram of the distribution.  
 (b) What one word best describes the shape of the distribution? How does this relate to the difficulty of the exam?  
 (c) How many students took Prof. Ratrunner's exam? Explain how you know.  
 (d) How many students obtained scores in the range 86-95? How many obtained scores of 85 or lower? What percentage of the class got scores of 85 or lower?  
 (e) Determine the cumulative frequencies for each score interval shown in the table, and plot a cumulative frequency graph. (Label both axes.)  
 (f) From the cumulative frequency graph, determine the number of students who scored at or below 85. (The value should be the same as that found in c.)

2. Max Morgan, biologist, measures the big toes of a number of Siberian Vampire bats. His data (in millimeters), are shown in the table at the right.
- | Length (mm) | f  |
|-------------|----|
| 15          | 4  |
| 14          | 6  |
| 13          | 4  |
| 12          | 18 |
| 11          | 7  |
| 10          | 3  |
| 9           | 5  |
- (a) Plot a frequency histogram of the data.  
 (b) What are the upper and lower real limits of the top (length = 15) interval?  
 (c) What is the mode of the distribution?  
 (d) What one word best describes the shape of the distribution?  
 (e) How many big toe lengths are summarized by the table?

3. Suppose the frequency column of the previous table had contained these values (from top to bottom): 1, 10, 9, 11, 8, 10, 1. What one word would best describe the shape of the distribution?

4. Third-grader Sammy has an idea. He will describe the 20 students in his class by associating a number with each one: a 0 if the student is a boy, and a 1 if the student is a girl. Scanning each student in the classroom (including himself), he obtains the following list: 0, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0.  
 (a) Make up a frequency distribution and plot a frequency histogram representing Sammy's data.  
 (b) What percentage of the class is made up of girls?  
 (c) Compute the mean of Sammy's set of numbers.  
 (d) Compare the value obtained in b with that obtained in c. Explain the relationship.

(over)

5. Ellen recently received her undergraduate degree in psychology. She has landed a great job, at the Institute for the Study of Primal Feedback, which she expects to be much more "relevant" than the boring courses stressing data analysis that she had to take in college. Her first day on the job, she is given the following set of numbers, representing the "relative Yin-Yang vibration dominance" scores of a group of 50 poets. She is supposed to make sense out of them.

83	62	29	43	44	68	51	60	71	98
11	47	40	19	60	54	23	61	52	59
28	66	92	84	49	21	36	40	71	50
59	40	32	61	70	34	55	70	62	48
38	33	45	27	75	56	40	39	60	46

- Summarize the data in an appropriate frequency distribution.
- Plot a frequency polygon to represent the distribution graphically. (Choose the x-axis and y-axis scales so that you do not get a tall, skinny or a short, fat graph. Label both axes of the graph.)
- Determine the cumulative frequency for each interval of your frequency distribution and plot a cumulative frequency graph. From this graph, find the approximate score below which 50% of the scores in the distribution fall.

6. An experiment is performed measuring how long it takes to read a word aloud. A word is presented visually, a clock starts, and a device stops the clock when it detects the experimental subject's voice. The following represent reading times (measured in seconds). (a) Make up an appropriate frequency distribution to summarize the data.

.758	.832	.690	.945	1.063	.788	.540	.812
1.331	.793	.639	.687	.726	.592	.605	.876
.579	.654	.725	.704	1.307	.632	.580	.636
.555	.748	.620	.949	.586	.603	.970	.842
.688	.634	.612	.570	.705	1.150	.752	.667

- Graph the data in a frequency polygon.
- What one word best describes the shape of the distribution?

1. A pollster asks 60 people how many times they ate in a restaurant in 1984. The table at the right summarizes their responses.

	REST. VISITS	FREQ.
(a) What is the mode?	30-34	6
(b) Find the median.	25-29	12
(c) Find the percentile rank of 11 restaurant visits.	20-24	22
(d) Find the percentile rank of 29 visits.	15-19	14
(e) Find the 75th percentile.	10-14	5
(f) Find the 25th percentile.	5-9	0
	0-4	1
{Ans: (a) 22, (b) 21.77, (c) 4, (d) 88, (e) 25.75, (f) 17.71}		

2. Plot a frequency histogram of the distribution given in (1). On the x-axis, indicate the median, the 75th, and the 25th percentiles.

3. (a) Find the range for the data in question (1). (b) From (e) and (f) in question (1), compute the measure of variability known as the semi-interquartile range.

4. Returning to the above data, compute the mean. {Ans: 21.67}

5. A psychologist working for the phone company calls Information in 30 major metropolitan areas and records the number of times the phone rings before the operator answers. The data are shown at right.

	NO. OF RINGS	f
(a) Name the three most frequently used measures of central tendency. (b) Find the value of each for these data. (c) Arrange the values (and names) in order of magnitude.	1	1
	2	4
(d) What term best describes the skewness of the distribution? (e) State a general rule from which the order in (c) could be derived from the answer to (d). (f) Suppose that, instead of answering after 11 rings, the slowest operator never did answer. The psychologist let the phone ring for an hour and then gave up.	3	10
	4	6
Which measure of central tendency could <u>not</u> be computed in such a situation? (g) The phone company tells the psychologist that they want to look good in their advertising. Which measure of central tendency should he recommend that they report? (h) A Public Interest Research Group wants to make the phone company look bad. Which measure should they use?	5	2
	6	3
	7	2
	8	0
	9	1
	10	0
	11	1

6. Find the median of each set of values:

- (a) 742, 629, 318, 906, 419, 683  
 (b) 8, 12, 4, 32, 36, 29, 9, 2, 40, 33  
 (c) .06, .22, .38, .13, .04, .22, .12

7. For each of the three sets of values in (6), compute (a) the mean, (b) the variance, and (c) the standard deviation. For (b) and (c), assume that each data set is a sample. Show your calculations! {Ans to (c): 215.5, 14.7, .117}