

SSN# _____

Political Science 585 (Anderson)
Sample Examination 2: Elementary Statistics
November 22, 2000

You have an hour and eighteen minutes to complete the exam. Please write your answers on the examination and consult with the instructor if you have questions or if you need clarifications.

1. On the eve of Thanksgiving, a small sample of students was asked “How many of the relatives you’ll see over Thanksgiving would you be more thankful not to see at all?” The respondents produced the following answers:

0	3	4	6	7	2	3	1	2	4	8
1	2	1	4	4	5	6	7	2	2	2

- a) Calculate the mean, median, and mode of this sample of respondents.

- b) Find the values for the first and third quartile marks.

2. Students in an American Government course received their exams back. The instructor presented them with this simple frequency table outlining each of the scores and the frequency associated with the score. A total of 274 students took the exam:

<i>Score</i>	<i>f</i>	<i>Score</i>	<i>f</i>
50	3	21	7
48	2	20	12
47	6	19	2
45	5	18	1
44	8	17	3
42	4	16	0
41	12	15	6
40	15	14	5
39	14	13	9
37	19	12	1
36	16	11	1
35	8	10	2
33	10	9	4
32	11	8	0
31	11	7	0
30	18	6	2
29	19	5	3
28	8	4	1
25	4	3	1
24	3	2	1
23	7	1	0
22	6	0	4

- a) Find the mean, median, and mode of this simple frequency distribution.
- b) Construct a **grouped frequency distribution** with 10 class intervals.
- c) Construct a stem and leaf plot using the grouped frequency distribution. What is the shape of the distribution?

4. In an undergraduate statistics class, there is a 60% chance that Jacque will receive a B or better in the course. There is an 80% chance that Marianne will receive a B or better. And there is a 30% chance that both will receive a B or better.

a) Draw a Venn Diagram representing the above numbers. Use probabilities rather than percentages.

b) What is the probability that Jacque alone will receive a B or better in the course? What is the probability that Marianne alone will receive a B or better in the course?

c) What is the probability that neither Jacque nor Marianne will receive a B or better in the course?

Now let's assume (more realistically) that after each person draws a number, they hold on to that number and await their fate (across the fence).

a) What is the probability that three odd numbers in a row (1, 3, or 5) are drawn?

b) What is the probability that an odd number, an even number, and then two odd numbers in a row are pulled?

c) What is the probability that the numbers, 1 through 5, are pulled out in order?

6. A 20-sided die (yes, they do have them) has 5 red, 3 green, 6 blue, 4 yellow, and 2 purple sides and the die is balanced such that any side has an equal probability of coming up. The die will be rolled several times. The following sequences are possible outcomes:

R B Y B Y P R P
B Y P G P Y G R
G G G B Y R P P
P Y P Y P Y G B
R R B B G G P Y

You have to bet on one of the above sequences. Figure out the probability of each of the sequences occurring and indicate which one you'd put your money on.

7. Trent Lott (the Senate Majority Leader) is conducting a survey of **all Republicans** in the Senate to determine the agenda to be pursued during the next congressional session. He asks all of his colleagues to rate how important they perceive issues of welfare reform to be. The higher the average rating, the more likely welfare reform will be to appear on the agenda. The rating scale ran from 1 (least important) to 7 (most important).

Lott found population mean importance rating among the 51 Republicans surveyed was 4.78 with a standard deviation of 2.374.

- a. Strom Thurmond reported a score of 7. Find the z-score associated with his raw score.
- b. What percentage of his fellow Republican Senators had scores at or below his score?
- c. What percentage of the Republicans had scores above Strom Thurmond's score?

9. A sociologist is comparing the number of criminal acts committed by children who grew up in abusive homes versus those who did not. She examines the psychological records of 10 randomly-selected juvenile offenders (five from abusive homes and five from non-abusive homes) looking for evidence of childhood-based, family-related trauma. She then examines the criminal records of each of these children.

She believes that children from non-abusive homes will have statistically different crime rates than children from abusive homes. Her data is presented below, with the number of crimes committed by non-abusive or abusive-family children listed in the cells of the table:

Non-Abusive (# of crimes)	Abusive (# of crimes)
1	3
4	6
3	10
2	8
9	1

Conduct a “difference of means” test to examine her hypothesis that there is a difference in crime rates between children from non-abusive and abusive homes.

10. A researcher in OSU's Curriculum Department is interested in whether or not undergraduate quality has improved over the last two years. She collects a random sample of 8 ACT scores from the freshman class and another 8 ACT scores from the second year class. The freshman class has a sample mean ACT score of 24 with a standard deviation of 1. The sophomore class has a sample mean ACT score of 22 with a standard deviation of 4.

The researcher believes that the freshman sample mean is significantly higher than the sophomore sample mean. Using a one-tailed test of statistical significance, determine whether there is any support for the researcher's hypothesis. Use $\alpha = 0.05$ as your level of statistical significance.