Probability and Statistics Final Exam Review – DUE THURSDAY 3/12 FOR 50 POINTS!

Chapter 12

1. Let Q = {A, B, C, D}. List all of the ways that you can select two different members of Q. The order in which you select the members is not important.

{AB, AC, AD, BC, BD, CD}

2. Let Q = {A, B, C, D}. List all of the ways that you can select two different members of Q. The order in which you select the members is important.

{AB, AC, AD, BC, BD, CD,
BA, CA, DA, CB, DB, DC}

3. A club has 28 members. In how many ways can they select a person to be President and a different person to be Treasurer?

28 · 27 = 756 ways

4. A thirteen-sided die is rolled three times. In how many ways can this happen?

13 · 13 · 13 = 2,197 ways

5. How many license plates are possible consisting of 3 letters followed by 2 digits, if the first letter must be a F.

1 · 26 · 26 · 10 · 10 =

6. Using the digits 3, 4, 5, 6, and 7, how many 4-digit numbers can be constructed if the number must begin with an odd digit and digits may not be repeated?

3 · 4 · 3 · 2 = 72 ways

7. Evaluate P(6, 3)

CALC

120

8. Evaluate C(8, 0)

CALC

1

9. Evaluate P(2, 0)

CALC

1

10. Describe where C(22, 4) can be found in Pascal's triangle.

22ND row, 4th entry

Chapter 13

11. A box contains 4 blue cards numbered 1 through 4, and 2 green cards numbered 1 through 2. List the sample space of picking a blue card followed by a green card.

$\{(1,1)(1,2)(2,1)(2,2)(3,1)(3,2)(4,1)(4,2)\}$

12. The Ace's are separated from a deck of standard playing cards and shuffled. One is randomly selected, and then a normal die is rolled. List all equally likely outcomes in the sample space.

$\{(A\heartsuit,1)(A\heartsuit,2)(A\heartsuit,3)(A\heartsuit,4)(A\heartsuit,5)(A\heartsuit,6)$
$(A\diamondsuit,1)(A\diamondsuit,2)(A\diamondsuit,3)(A\diamondsuit,4)(A\diamondsuit,5)(A\diamondsuit,6)$
$(A\spadesuit,1)(A\spadesuit,2)(A\spadesuit,3)(A\spadesuit,4)(A\spadesuit,5)(A\spadesuit,6)$
$(A\clubsuit,1)(A\clubsuit,2)(A\clubsuit,3)(A\clubsuit,4)(A\clubsuit,5)(A\clubsuit,6)\}$

13. Consider the genetic possibilities for a child of parents in which one parent has sickle cell anemia (a recessive disorder), and the other parent is a carrier of the disease. What is the probability that the child will have the disease? Be a carrier?

	S	S
N	Ns	Ns
S	ss	ss

disease: 2/4 = 50%

carrier: 2/4 = 50%

14. In crossbreeding certain type of flowers, color does not dominate. For example, a flower with one green gene and one red gene will have orange flowers. Consider the result of crossing a pure-bred green flower with a pure-bred red flower. What is the probability of getting red flowers in the first generation of plants?

	g	g
r	rg	rg
r	rg	rg

red = 0/4 = 0%

***in the following problems be careful whether it's ODDS for or ODDS against something!!!!!*

15. Five slips of paper marked with the numbers 1, 2, 3, 4, and 5 are placed in a box and mixed well. Two are drawn. What are the ODDS that the sum of the numbers on the two selected slips is not 4? ← event

sample space

(20) S: $\{(1,2)(1,3)(1,4)(1,5)(2,1)(2,3)(2,4)(2,5)(5,1)(5,2)$
$(3,1)(3,2)(3,4)(3,5)(4,1)(4,2)(4,3)(4,5)(5,3)(5,4)\}$

P(E) = 18/20

P(E') = 2/20

ODDS = $\frac{18/20}{2/20}$ = 18 : 2

16. What are the ODDS of drawing a 3 from the cards in #15?

P(E) = 1/5

P(E') = 4/5

ODDS = $\frac{1/5}{4/5}$ = 1 : 4

17. What are the ODDS of drawing an odd number from the cards in #15?

P(E) = 3/5

P(E') = 2/5

ODDS = $\frac{3/5}{2/5}$ = 3 : 2

18. If two fair dice are rolled, what is the probability that a total of 5 shows?

(1,4)(2,3)(3,2)(4,1)

P(sum 5) = 4/36 = 11%

19. If a card is selected randomly from a standard 52-card deck, what is the probability that we draw a 9?

P(9) = 4/52 = 7.7%

20. If P(A) = 5/9, then find the ODDS *against* A happening.

P(A') = 4/9 ODDS AGAINST: $\frac{4/9}{5/9}$ = 4:5

21. If it has been determined that the probability of an earthquake occurring on a certain day in a certain area is P(E) = 1/75, what are the ODDS *against* an earthquake?

P(E') = 74/75 ODDS AGAINST = $\frac{74/75}{1/75}$ = 74:1

Chapter 14

***complete the frequency and relative frequency tables below*

22. Jack asked his buddies how many hours they worked during the previous week at their after-school jobs. The data follows:

8 3 8 8 7 0 4 10 7 2 8 9 8 8

Hours	Frequency	Relative frequency
0-2	4	4/14 0,29
3-5	3	3/14 0,21
6-8	3	3/14 0,21
9+	4	4/14 0,29
	= /14	

23. On a math test, the scores of 10 students were as follows:

99 85 74 56 68 68 74 99 95 90

Scores	Frequency	Relative frequency
50-59	1	1/10 0,10
60-69	2	2/10 0,20
70-79	2	2/10 0,20
80-89	1	1/10 0,10
90-99	4	4/10 0,40
	= /10	

24. Construct a bar graph for the *relative frequency* data in the table below (winners of a game played each year)

Winner	Frequency	Relative frequency
Joe	3	0.25
John	1	0.08
Jack	2	0.17
Josh	6	0.50

25. Construct a bar graph for the *frequency* data in the table below (winners of a game played each year)

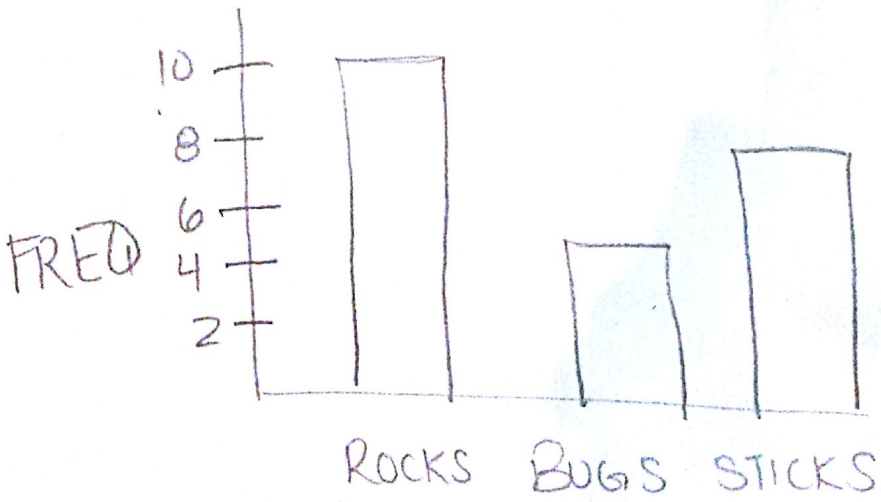
Winner	Frequency	Relative frequency
Joe	3	0.25
John	1	0.08
Jack	2	0.17
Josh	6	0.50

26. Students in Ms. D's class collected stuff from outside. Below is what they collected. Construct a bar graph for the frequency data.

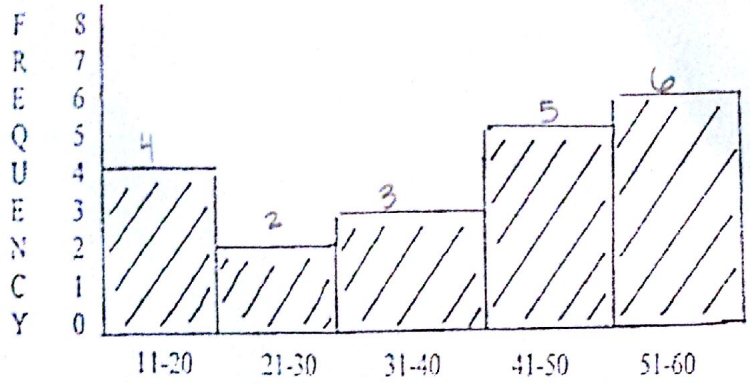
Rocks, 10

Bugs, 5

Sticks, 8

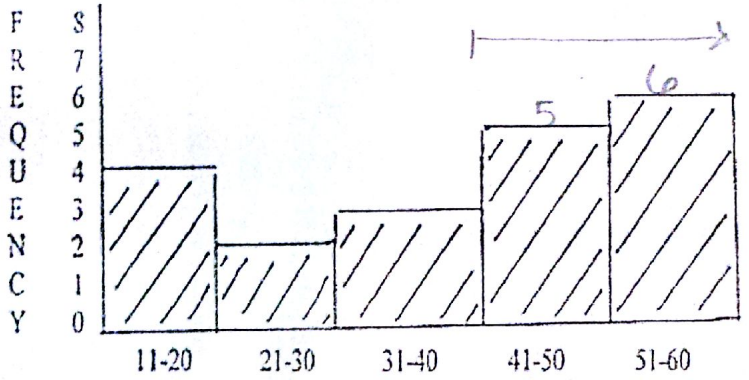


27. The ages of people randomly surveyed on a college campus are summarized in a bar graph. How many people were surveyed?



20 ppl

28. The ages of people randomly surveyed on a college campus are summarized in a bar graph. How many people were 41 years or older?



11 ppl

29. Find the mean, median and mode of : 6, 7, 4, 5, 5, 8, 9, 2, 3, 8, 2, 2, 1

CALC $\bar{x} = 4.8$

med = 5

mode = 2

30. What is the mode of this data: 44, 56, 75, 23, 56, 71, 82, 93, 46, 44, 61

mode = 44, 56

31. What is the mean for the data in #30?

CALC

$\bar{x} = 59.2$

32. Assume that in you Spanish class you have earned the following test scores: 55, 78, 85, 91, 62, and only one test remains. If you need a mean score of 70 to earn a C, then what minimum score must you obtain on the last test?

$$\frac{55+78+85+91+62+x}{6} = 70 \cdot 6$$

$$371 + x = 420$$

$x = 49$

33. Assume that in a 30-day month you begin with a $20 balance due on your credit card, you charge an item for $50 on the 14th, and an item for $200 on the 21st of the month. What is your average daily balance on your credit card for this month?

DAY 1-13 $20 × 13 days = 260
DAY 14-20 $70 × 7 days = + 490
DAY 21-30 $270 × 10 days = + 2700
$3450 ÷ 30 days

ADB = $115

34. Test scores of 20 students are below. Construct a box and whisker plot of the data.

55 77 85 84 98 96 76 55 42 99
87 78 88 76 78 79 66 65 97 55

CALC

min 42
Q_1 65.5
med 78
Q_3 87.5
max 99

35. Find the range for the data: 8 15 9 4 1 23

23 − 1 = 22

36. Find the standard deviation of the numbers in #35

CALC $S_x = 7.9$

37. Find the mean and standard deviation of the following data:

Number	3	4	5	6	7
frequency	2	1	5	2	3

CALC $\bar{x} = 5.2$
$S_x = 1.4$

38. The table below gives the annual incomes, in thousands of dollars, for 4 families. Find **the number of standard deviations d's income is from the mean** (z-score stuff..)

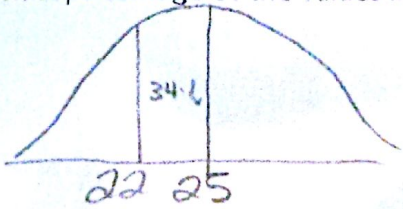
Family	a	b	c	d
Annual income	35	62	51	44

CALC: $\bar{x} = 48$
$S_x = 11.4$

$z = \frac{44 - 48}{11.4} = -0.35$

39. Assume that a distribution has a mean of 25, and a standard deviation of 3. What percentage of the values in the distribution do we expect to fall between 22 and 25?

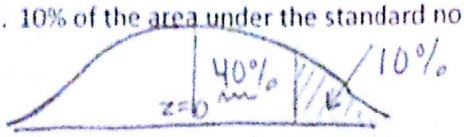
34%



40. Find the area under the normal curve between z = 0 and z = 1.46

42.8% CHART

41. 10% of the area under the standard normal curve is above the score z = 1.28

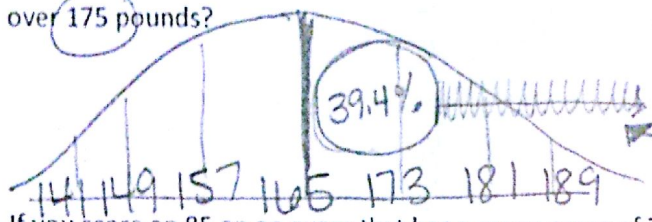


$z = 1.28$

42. Mean is 75, standard deviation is 5, raw score is 83. Find z-score.

$$z = \frac{83-75}{5} = 1.6$$

43. Assume that among the members of a lady's gym, the distribution of body weights has a mean of 165 pounds, and a standard deviation of 8 pounds. If 333 women belong to the gym, how many women do you expect to be over 175 pounds?

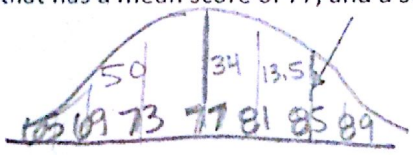


$z = \frac{175-165}{8} = 1.25$

10.6% of 333 women

= 35 women

44. If you score an 85 on an exam that has a mean score of 77, and a standard deviation of 4, to what percentile does your score correspond?



50 + 34 + 13.5 = 97.5

97th

45. You are playing a game in which a single die is rolled. If a 1 or a 3 comes up, you win $12, otherwise you lose $12. What is your expected value for the game?

$$EV = \left(\frac{2}{6} \cdot 12\right) + \left(\frac{4}{6} \cdot -12\right) = -4$$

46. We roll a pair of dice. If the sum of the dice is 7, you pay me $22. If the sum is not 7, I pay you the number of dollars indicated by the sum of the dice. What is your expected value for the game? (*tricky – take your time to consider all pay-outs...) *see "cheat sheet"

$$EV = \left(\tfrac{1}{36} \cdot 2\right) + \left(\tfrac{2}{36} \cdot 3\right) + \left(\tfrac{3}{36} \cdot 4\right) + \left(\tfrac{4}{36} \cdot 5\right) + \left(\tfrac{5}{36} \cdot 6\right) + \left(\tfrac{6}{36} \cdot -22\right) + \left(\tfrac{5}{36} \cdot 8\right) + \left(\tfrac{4}{36} \cdot 9\right) + \left(\tfrac{3}{36} \cdot 10\right) + \left(\tfrac{2}{36} \cdot 11\right) + \left(\tfrac{1}{36} \cdot 12\right)$$

$= 2.2$

47. You are playing a game in which a single die is rolled. If an even number comes up, you win $16. If an odd number comes up, you lose $16. Is this a fair game?

$$EV = \left(\tfrac{3}{6} \cdot 16\right) + \left(\tfrac{3}{6} \cdot -16\right) = 0$$

YES

48. In a raffle, one thousand tickets are sold at $20 apiece. There is a grand prize of $8000, three second place prizes of $2000, and five third place prizes of $1000. Is this a fair game?

$$EV = \left(\frac{1}{1000} \cdot 7980\right) + \left(\frac{3}{1000} \cdot 1980\right) + \left(\frac{5}{1000} \cdot 980\right) + \left(\frac{991}{1000} \cdot -20\right)$$

$= -1$

NO

49. Suppose that there is a lottery that cost $2 to play. You must pick 5 digits from 0 to 9, and duplicates are allowed. If you win, the prize is $4000. What is the expected value of this lottery?

$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 100{,}000$ possible #'s.

$$EV = \left(\frac{1}{100{,}000} \cdot 3998\right) + \left(\frac{99{,}999}{100{,}000} \cdot -2\right) = -1.96$$

50. You are playing a game in which a single die is rolled. If a 1 or a 4 comes up, you win $33, otherwise you lose $10. What is the price that you should pay to play the game that would make the game fair?

$$EV = \left(\tfrac{2}{6} \cdot 33\right) + \left(\tfrac{4}{6} \cdot -10\right) = \$4.33$$