

Math 110 Exam Review

1. True or False

- a. \_\_\_\_\_  $a \in \{a, e, i, o, u\}$
- b. \_\_\_\_\_  $\{a\} \subseteq \{a, e, i, o, u\}$
- c. \_\_\_\_\_  $y \subseteq \{x, y, z\}$
- d. \_\_\_\_\_  $\{3, 4\} \subseteq \{4, 3\}$
- e. \_\_\_\_\_  $\{6, 7\} \in \{5, 6, 7, 8\}$
- f. \_\_\_\_\_  $\phi \subseteq \{w, x, y, z\}$
- g. \_\_\_\_\_  $b \notin \{a, b, c\}$

2. Let  $U = \{a, b, c, d, e, f, g\}$ ,  $K = \{c, d, f, g\}$ ,  $R = \{a, c, d, e, g\}$ , and  $S = \{c, d, e\}$ . Find the following:

- a.  $K \cup R$
- b.  $K \cap R'$
- c.  $K \cap (R \cup S)'$
- d. The number of subsets of K \_\_\_\_\_
- e. The number of proper subsets of K \_\_\_\_\_

3. Television Viewing Habits. A telephone survey of television viewers revealed the following information.

- 20 watch situation comedies
- 19 watch game shows
- 27 watch movies
- 5 watch both situation comedies and game shows
- 8 watch both game shows and movies
- 12 watch only movies
- 3 watch all three
- 6 watch none of these

- a. How many viewers were interviewed?
- b. How many viewers watch comedies and movies but not game shows?
- c. How many viewers watch only game shows?
- d. How many viewers watch comedies or game shows but not movies?
- e. How many viewers watch movies or game shows?
- f. How many viewers watch movies and comedies?

4. A coin is tossed and then a day of the week is selected. Write the sample space.

5. a. Two cards are drawn from an ordinary deck of 52 cards. Find the probability they are both aces.

One card is drawn from a deck of 52, find the probability of getting

- b. a diamond or a 7
  - c. a black card or an ace
  - d. a red card or a face card
  - e. face card and red
  - f. heart and ace
6. If the probability that a team will win their next game is  $\frac{5}{7}$ , find the odds that they will win their next game.

7. If the odds that Joe will get a job offer are 7 to 2, what is the probability that he will get a job offer?

8. Complete the following:

- a. The sum of the probabilities of all possible outcomes is \_\_\_\_\_.
- b. The probability of a certain event is \_\_\_\_\_.
- c. The probability of an impossible event is \_\_\_\_\_.
- d.  $P(E') =$  \_\_\_\_\_
- e. All probabilities lie between \_\_\_\_\_.

9. The following table is the result of a survey of 400 customers at a restaurant that serves hamburgers and chicken sandwiches.

	Satisfied	Not Satisfied	Totals
Hamburgers	220	35	255
Chicken	125	20	145
Totals	345	55	400

One customer is randomly selected. Find the probability

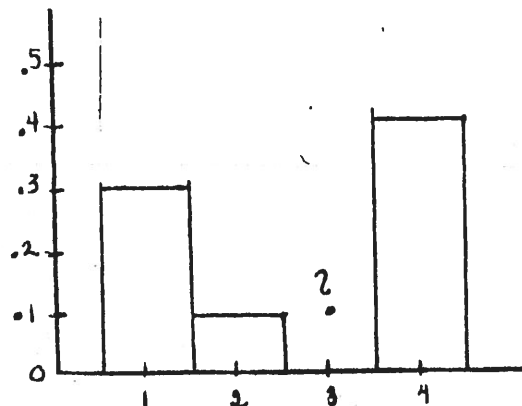
- a. the customer is satisfied
  - b. the customer ordered a hamburger
  - c. the customer was satisfied, given the customer ordered a hamburger
  - d. the customer was satisfied and ordered the hamburger
  - e. the customer ordered chicken given the customer was satisfied.
10. A jar contains 3 black and 2 white balls. If you roll a single die and select a ball, find the probability that you roll a 4 and select a black ball.

11. Complete the probability distribution and the histogram.

a.

$R$	0	2	4	6	8
$P(R)$	0.20	0.22	0.24	0.16	0.08

b.



12. Sally can choose 3 activities for her "free time" program at camp. She must choose one activity from each of the following categories.

Outdoor skills: canoeing, archery, rappelling

Crafts: weaving, painting, photography, wood carving

Survival Skills: First Aid, orienteering, water safety

How many different "free time" programs are possible?

13. Find the number of distinguishable permutations of the word "opinion".

14. In a certain state, license plates consist of 2 letter followed by 4 digits. How many license plates are possible if repetitions are allowed?

15. There are 12 contestants in the talent show. The winner will receive \$1000, second place will receive \$500, and third place will receive \$100. How many ways can the 3 prizes be awarded?

16. A group of 5 pictures consists of 2 landscapes and 3 puppies. How many ways can they be arranged if

- like types are kept together
- the first picture must be of puppies.

17. The bookstore has a sale on books by Mark Twain and Sinclair Lewis. There are 7 books by Twain and 5 by Lewis in the sale. George would like to select 2 books by each author. How many ways can he make his selection?

18. A basket contains 4 black, 2 blue and 5 green balls. A sample of 3 balls is drawn. Find the probabilities that the sample will contain the following.

- all black balls
- 2 black and 1 green ball

19. A bucket contains 15 water guns. 10 have water in them and 5 are empty. If you select 3 water guns at random, find the probability that none of them will be empty.
20. A bag of marbles contains 5 red, 4 blue, and 5 green. If two marbles are selected at random, what is the probability that the two marbles are the same color?
21. A traveling salesman sells frozen food. 60% of his customers buy steaks and 42% buy seafood. Also 12% buy both seafood and steaks. What is the probability that a customer will buy steaks or seafood?
22. In the sophomore class at Winston University, 45% of the students are taking a math class, 57% of the students are taking a geography class and 63% of the students are taking math or geography classes. Find the probability that a student is taking math and geography.
23. According to a recent study of American voters, 27% of women and 36% of men are Republican. In recent elections, 51% of voters were women and 49% were men. If a voter is selected at random find the probability the voter is
- a man and a Republican.
  - a Republican.
  - a woman given the voter is Republican.
24. The incoming freshmen class at Winston college shows that 38% come from single-parent homes and 62% come from two-parent homes. The financial aid office reports that 65% of students from single parent homes receive financial aid and 42% of those from two-parent homes receive financial aid. Suppose an incoming freshman received financial aid. Find the probability the student is from a two-parent home.
25. Six mice from the same litter, all suffering from a vitamin A deficiency, are fed a certain dose of carrots. If the probability of recovery under such treatment is .70, find the probabilities of the following results.
- exactly 3 of the 6 mice recover
  - at least one recovers
26. A recent study of minimum wage earners found that 55% of them are 16 to 24 years old. Suppose a random sample of 12 minimum wage earners is selected. What is the probability that 7 of them are 16 to 24 years old?
27. A raffle has a first prize of \$400, two second prizes of \$75 each and 10 third prizes of \$20 each. One thousand tickets are sold at \$1.00 each. Find the expected winnings of a person buying 1 ticket.

28. For the following list of test scores: 98, 70, 32, 48, 71, 80, 85, 50, 46, 71. Find the following:

- a. mean
- b. median
- c. mode
- d. range
- e. standard deviation

29. Use the following frequency distribution to find

- a. mean
- b. median
- c. mode
- d. range
- e. standard deviation

x	f
7	9
8	3
9	5
10	7

30. For the following distribution find the mean.

Interval	Frequency
40 - 44	2
45 - 49	5
50 - 54	7
55 - 59	10
60 - 64	4
65 - 69	1

31. Find the percent of the area under the normal curve between  $z = -.94$  and  $z = -1.52$ .

32. The the z-score satisfying the following condition: 27% of the area is left of z.

33. A machine produces items having a mean length of 11.8 centimeters, with a standard deviation of .4 centimeters. The lengths are normally distributed. Find the probability that an item will have a length

- a. less than 11.4 centimeters.
- b. between 10.8 and 11.9 centimeters.
- c. more than 11.5 centimeters.
- d. If the shortest 10% are to be discarded, what is the cutoff length of the bottom 10%?