

T MATYC
Statistics Test
Spring 2001

1. If two events are independent, the probability that both occur is:
 - a) zero
 - b) the sum of their individual probabilities
 - c) the product of their individual probabilities
 - d) one

2. Identify the correct statement about the basic properties of probability.
 - a) An event that is certain not to happen has a probability of 1.
 - b) Probabilities are numbers whose values can be any number from -1 to $+1$.
 - c) The probability of any single event occurring must be less than 1.
 - d) The total probability assigned to a sample space must be exactly 1.

3. A sample distribution has a mean of 40 and a standard deviation of 4. Chebyshev's Theorem guarantees that at least 75% of the data lies between
 - a) 28 and 52
 - b) 30 and 50
 - c) 32 and 48
 - d) 36 and 44

4. The distribution of grade point averages for a particular university is normally distributed with a mean of 2.5 and a standard deviation of 0.5. If students with a 3.5 grade point average or higher graduate with honors, then according to the empirical rule approximately what percent of the students will this include?
 - a) 2.5%
 - b) 5%
 - c) 17%
 - d) 34%.

5. When testing a hypothesis at the 95% confidence level using the P-value, the null hypothesis is rejected if
 - a) $P < 0.05$
 - b) $P = 0.05$
 - c) $P \neq 0.05$
 - d) $P > 0.05$

6. Find the standard deviation of the following sample of a set of scores on a statistics test:
{95, 90, 78, 65, 85, 96, 91, 88, 73, 85, 89, 89, 93}
 - a) 8.0
 - b) 8.5
 - c) 8.6
 - d) 9.0

7. Some hotels ask their guests to rate the hotel's services as excellent, very good, good, or poor. This is an example of what data level?

- a) interval b) nominal c) ordinal d) ratio

8. For the probability distribution given at right, what is the expected value of x ?

x	$P(x)$
10	0.2
20	0.3
30	0.4
40	0.1

- a) 24 b) 25 c) 26 d) 28

9. A bank has the following data on the gender and marital status of 200 customers.

	Male	Female	Totals
Single	20	30	50
Married	100	50	150
Totals	120	80	200

If a customer is female, what is the probability that she is single?

- a) $2/5$ b) $3/5$ c) $3/8$ d) $3/20$

10. A salesperson contacts 8 potential customers per day. From past experience he knows that the probability of a potential customer making a purchase is 0.30. What is the probability that the salesman will make at least 2 sales in a day?

- a) 0.7447 b) 0.7580 c) 0.7613 d) 0.7767

11. X is a normally distributed random variable with a mean of 8 and a standard deviation of 4. What is the probability that X is between 7.2 and 9.2?

- a) 0.1972 b) 0.2345 c) 0.2602 d) 0.2957

12. A consumer-watch group wants to estimate the actual amount of soft drink in one-liter bottles purchased from a leading distributor. It is known from the distributor's specifications that the standard deviation of the amount of soft drink is equal to 0.02 liters. From a random sample of 50 bottles, the group found the average amount to be 0.995 liters. Which of the following is the correct 99% confidence interval for the amount of soft drink in each bottle?

- a) $0.9011 \leq m \leq 1.0889$ b) $0.9357 \leq m \leq 1.0543$
 c) $0.9877 \leq m \leq 1.0023$ d) $0.9906 \leq m \leq 0.9994$

13. The life expectancy of a particular brand of tire is normally distributed with a mean of 40,000 miles and a standard deviation of 5000 miles. What is the probability that a randomly selected tire will have a life of at least 30,000 miles?

- a) 0.9572 b) 0.9772 c) 0.9789 d) 0.9842

14. It is known that the population variance equals 484; what is the minimum sample size that needs to be taken if the desired error from the mean is 5 or less with 95% confidence?

- a) 25 b) 50 c) 75 d) 100

15. Salary information for random samples of male and female employees of a large company is shown below.

	Male	Female
Sample Size	64	36
Sample Mean Salary (in \$1000)	44	41
Sample Variance	128	72

The standard error of the difference between the two means is:

- a) 2.0 b) 4.0 c) 4.24 d) 7.46

16. The paired data below consists of weights (in pounds) of discarded paper and sizes of households.

Paper	3.41	5.57	8.24	9.17	6.57	3.56	4.17	7.23
Household size	2	3	3	6	4	2	1	5

The value of the linear correlation coefficient r is:

- a) 0.596 b) 0.642 c) 0.670 d) 0.836

17. A sample of 18 observations selected from a normally distributed population produced a sample variance of 4.6. The null hypothesis to be tested is $H_0 : \sigma^2 \leq 2.2$.

Which of the following is correct, using the 5% significance level?

- a) The test statistic is $\chi^2 = 29.368$; reject the null hypothesis.
 b) The test statistic is $\chi^2 = 29.368$; do not reject the null hypothesis.
 c) The test statistic is $\chi^2 = 35.545$; reject the null hypothesis.
 d) The test statistic is $\chi^2 = 35.545$; do not reject the null hypothesis.

18. The recovery time after a certain type of surgery is a continuous random variable with a uniform distribution between 6 and 10 days. What is the probability of needing between 7 and 9 days to recover?

- a) 0.4 b) 0.5 c) 0.6 d) 0.75

19. For the following two sets of data:

X:	17	21	18	20	21	14	21	30
Y:	7	14	7	9	12	6	15	17

What is the slope of the linear regression equation?

- a) 0.716 b) 0.781 c) 0.867 d) 0.931

20. In order to determine whether tutors were beneficial in a statistics class, students were asked whether or not they used one, and whether or not their statistics grade was an A or B. The following results were gathered:

	Received A or B	Did not receive A or B
Used tutors	70	10
Did not use tutors	20	50

The hypothesis that the letter Grade of A or B is independent of using a tutor was tested at the 5% level of significance and the critical value was 3.84. What was the test statistic?

- a) 1.96 b) 2.75 c) 10.08 d) 54.02

21. A population of 200 elements has a mean of 36 and a standard deviation of 8. If random samples of size 17 are taken, what is the standard deviation of the sampling distribution of the sample means?

- a) 1.86 b) 2.83 c) 4 d) 8

22. In a two-tailed hypothesis test, the test statistic is determined to be -2.5 . What is the p-value for this test?

- a) -1.25 b) -0.4938 c) 0.0062 d) 0.0124

23. The table below represents an analysis of variance of five individual's recognition time to three commercial tunes. The null hypothesis $H_0 : \mu_1 = \mu_2 = \mu_3$ is tested at the 0.05 significance level.

Source Factor	DF	SS	MS	F	p
	2	20.68	10.34	6.68	0.011
Error	12	18.59	1.55		
Total	14	39.27			

Which one of the following is true?

- a) The critical value is $F = 3.8853$; reject the null hypothesis.
- b) The critical value is $F = 3.8853$; do not reject the null hypothesis.
- c) The critical value is $F = 9.0135$; reject the null hypothesis.
- d) The critical value is $F = 9.0135$; do not reject the null hypothesis.

24. If the lengths of pregnancies is normally distributed with a mean of 268 days and a standard deviation of 15 days, what is the probability that a Lamaze class of 25 women will have a mean pregnancy of less than 260 days?

- a) 0.0038
- b) 0.0170
- c) 0.1255
- d) 0.3749

25. If the weatherman states that there is a 30% probability of rain both Saturday and Sunday and a 20% probability on Monday, what is the probability of no rain during the three days?

- a) 39.2%
- b) 60.8%
- c) 80.0%
- d) 82.0%

ANSWERS:

- 1. C 2. D 3. C 4. A 5. A 6. D
- 7. C 8. A 9. C 10. A 11. A 12. C
- 13. B 14. C 15. A 16. D 17. C 18. B
- 19. B 20. D 21. A 22. D 23. A 24. A
- 25. A