

**Statistics Final Exam**  
**Spring 2009- version 1**

**Print Name:** \_\_\_\_\_

Instructions: Circle the correct response on the multiple-choice problems. Show your work on the short answer problems. Don't forget the units.

- (M) 1. Identify the example of a random sample of a population.
- A. The television shows watched by all Americans
  - B. The lengths of trout caught by fisherman surveyed at a lake on a weekend
  - C. All of the cards in a 52-card deck
  - D. Registered Oklahoma voters
  - E. The automobiles bought by Americans in a single year
- (M) 2. Choose the word that does **NOT** complete the following statement:  
Statistics is the study of how to \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ numerical information from data.
- A. collect
  - B. organize
  - C. correlate
  - D. analyze
  - E. interpret
- (M) 3. A professor of social science at a certain university questioned 200 students out of a total enrollment of 12,243 concerning their opinions of the quality of various university services. Identify the variable.
- A. the professor
  - B. 200 students
  - C. social science
  - D. the total enrollment
  - E. the students' opinions
- (M) 4. A neighbor's dog is named Rocky. Circle the highest level of measurement for the name of the dog.
- A. nominal
  - B. ordinal
  - C. interval
  - D. ratio
  - E. conditional
- (M) 5. A neighbor's dog in problem 4 was born on 01/06/04. Circle the highest level of measurement for the birth date of the dog.
- A. nominal
  - B. ordinal
  - C. interval
  - D. ratio
  - E. conditional
- (M) 6. The manager of an automobile repair shop tests a computerized diagnostic machine by comparing its performance on a random sample of 20 vehicles with the evaluation of a professional mechanic for the same 20 vehicles. What technique for gathering data do you think was used in the study?
- A. sampling
  - B. experiment
  - C. simulation
  - D. census
  - E. correlation

- (M) 7. Suppose you want to survey a sample of the registered voters of Chicago regarding their opinions about a proposed increase in sales tax. You divide the registered voters according to age and sample from each of the age categories. Circle the sampling method used.
- A. Stratified Sample.      B. Systematic Sample      C. Cluster Sample  
D. Convenience Sample      E. Simple Random Sample
- (M) 8. Texas Parks and Wildlife administered medicine to 50 sheep that were all suffering from a form of mange. Two months later, 42 showed noticeable signs of improvement. What technique for gathering data was used in the study?
- A. Observational Study      B. Experiment      C. Cluster Sampling  
D. Simple Random Sampling      E. none of these
- (M) 9. If event  $A$  is certain to occur, what is  $P(A)$ ?
- A. 0      B. 0.25      C. 0.5      D. 0.75      E. none of these
- (M) 10. Alice, Carol, Bob and Dick all volunteer to be subjects for a psychology experiment. One person is to be chosen at random from this group. Each person is equally likely to be chosen. What is the probability that Alice will not be chosen?
- A.  $\frac{1}{2}$       B.  $\frac{1}{4}$       C. 0      D.  $\frac{3}{4}$       E. none of these
- (M) 11. A coin is to be tossed 1000 times. What is the probability that the 785th toss is heads?
- A. 0      B.  $\frac{1}{4}$       C.  $\frac{1}{2}$       D.  $\frac{3}{4}$       E. none of these
- (M) 12. A single six person jury must be selected from a pool of 15 jurors. How many ways can a group of six people can be selected?
- A. 3,603,600      B. 90      C. 720      D. 5005      E. none of these
- (M) 13. Five black and five white marbles are in a box. Without looking, three marbles are taken from the box without replacement. What is the probability that all three are black?
- A.  $\frac{1}{12}$       B.  $\frac{25}{144}$       C.  $\frac{1}{8}$       D.  $\frac{3}{50}$       E. none of these

- (M) 14. Choose the statement below that is **NOT** a fact about probabilities.
- A. The probability of an event  $A$  is denoted by  $P(A)$ .
  - B. The sum of the probabilities of outcomes in a sample space is 1.
  - C.  $P(\text{not } A) = 1 + P(A)$
  - D.  $P(A) + P(\text{not } A) = 1$
  - E. If  $A$  is a certain event, then  $P(A) = 1$ .
- (M) 15. The voltage on a power line is an example of which type of random variable?
- A. Continuous
  - B. Discrete
  - C. Binomial
  - D. Nominal
  - E. none of these
- (M) 16. Patricia teaches flying lessons at a local airfield. She estimates that 40% of the people she talks to about flying lessons end up learning to fly with her. What is the smallest number of people Patricia needs to talk to in order to be at least 90% sure she will have three or more new flying students?
- A. 12
  - B. 10
  - C. 8
  - D. 14
  - E. none of these
- (M) 17. Dorothy leads wilderness expeditions. She has found that 15% of those who attend a promotional meeting will sign up for an expedition at the meeting. If 20 people attend a meeting, what is the probability that five or more of them will sign up?
- A. 0.103
  - B. 0.933
  - C. 0.170
  - D. 0.067
  - E. none of these
- (M) 18. In a small town in the mid-west United States, 43% of the town's current residents were born in the town. Use the geometric distribution to estimate the probability of meeting a native to the town among the first four people that are met.
- A. 0.89
  - B. 0.68
  - C. 0.08
  - D. 0.17
  - E. none of these

- (M) 19. Based on polling results in a particular city, it was found that 7% of cars and trucks are black in color. Use the Poisson distribution to estimate the probability of encountering 2 or more black vehicles among 20 that are noticed on the road.
- A. 0.65      B. 0.41      C. 0.17      D. 0.76      E. none of these
- (M) 20. The graduation rate for seniors at a certain university in any particular year is, on average, 72.1% and is normally distributed. The population standard deviation is 3.5%. What is the probability, in any given year, that between 79.1% and 82.6% of the seniors will graduate?
- A. 0.025      B. 0.047      C. 0.135      D. 0.270      E. .021
- (M) 21. The operating life of a Sports Master fishing reel is normally distributed with mean 48 months and standard deviation 6 months. The manufacturer will replace any Sports Master reel that malfunctions during the guarantee period. How long (to the nearest month) should the guarantee period be if the manufacturer does not want to replace more than 5% of the reels?
- A. 38 mo      B. 58 mo      C. 6 mo      D. 12 mo      E. none of these
- (M) 22. Coal is carried from a mine in West Virginia to a power plant in New York in hopper cars on a long train. The automatic hopper car loader is set to put 90 tons of coal into each car. The actual weights of coal loaded into each car is *normally distributed* with mean  $\mu = 90$  tons and standard deviation  $\sigma = 3.3$  tons. What is the probability that ten cars chosen at random will have a mean load weight  $\bar{x}$  of more than 92 tons of coal?
- A. 0.2291      B. 0.0276      C. 0.2722      D. 0.0537      E. none of these
- (M) 23. A biologist is studying varieties of fungi in a state park. A preliminary study found that  $p$  was approximately 0.42, where  $p$  represents the proportion of the dominant variety of fungi to all varieties occurring in the park. For a 95% confidence level, how large a sample should be taken to ensure that the point estimate for  $p$  will be in error either way by less than 0.02?
- A. 1194      B. 2401      C. 2340      D. 47      E. 477

**Final Exam Version (circle one): version 1      version 2**

Circle the correct response. Five points each.

1.    A    B    C    D    E

2.    A    B    C    D    E

3.    A    B    C    D    E

4.    A    B    C    D    E

5.    A    B    C    D    E

6.    A    B    C    D    E

7.    A    B    C    D    E

8.    A    B    C    D    E

9.    A    B    C    D    E

10.   A    B    C    D    E

11.   A    B    C    D    E

12.   A    B    C    D    E

13.   A    B    C    D    E

14.   A    B    C    D    E

15.   A    B    C    D    E

16.   A    B    C    D    E

17.   A    B    C    D    E

18.   A    B    C    D    E

19.   A    B    C    D    E

20.   A    B    C    D    E

21.   A    B    C    D    E

22.   A    B    C    D    E

23.   A    B    C    D    E

**Instructions:**

**Show your work in a detailed, step-by-step manner on the remainder of the exam.**

24. A random sample of 30 computer outlet stores were selected in the New York area and the price of a More Joy joystick (a computer attachment used to play games on a computer) was checked at each store. The results to the nearest dollar follow:

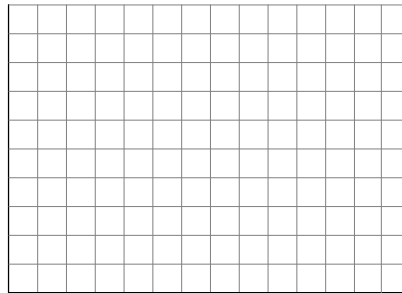
78 65 92 100 99 63 82 87 91 95 102  
73 69 75 86 94 97 112 115 76 89 96  
94 69 70 72 80 100 90 74

Check your data entry, by verifying  $\bar{x} = 86.17$ .

- (a) Make a frequency table for this data using 5 classes. Show class limits, class boundaries, frequencies and midpoints.

Class Limits	Class Boundaries	Frequency	Midpoints

- (b) Draw a histogram. Completely label and annotate the graph.



25. The Jackson Dormitory complex has a computer lab to give students easy access to computers. However there is a complaint that a few students seem to monopolize the equipment. To study usage patterns, a random sample of 160 users was selected. The time each student spent on the computer during one session was measured. The times (to the nearest minute) were:

<b>Time</b>	1 – 60	61 – 120	121 – 180	181 – 240
<b>Frequency</b>	70	50	30	10

Estimate the sample mean and sample standard deviation for time of student sessions on the computer. Round to one decimal place.

$$\bar{x} \approx \underline{\hspace{2cm}} \quad s \approx \underline{\hspace{2cm}}$$

26. Student Life did a survey of students in which they asked if the person is a part-time student or a full-time student. They also asked if the person had voted in the most recent student election. The results follow:

	<b>Part-time Student</b>	<b>Full-time Student</b>	<b>Row Total</b>
<b>Voted</b>	15	20	35
<b>Did not vote</b>	25	30	55
<b>Column Total</b>	40	50	90

If a student is selected at random from this group of 90 students, find the probability that:

- (a) The student voted in the most recent election.  
Leave in reduced fraction form or rounded to three decimal places.

- (b) The student voted in the most recent election, given that the student is a part-time student. Leave in reduced fraction form or rounded to three decimal places.

---



---

27. Troy took a standardized test to try to get credit for first-year Spanish by examination. His standardized score was 1.9. The mean score for the exam was 100 with standard deviation 12. The language department requires a raw score of 120 to get credit by exam for first-year Spanish. Compute Troy's raw score and determine if he will get credit for first-year Spanish based on this exam?

---

28. In September a biological research team caught, weighed, and released a random sample of 54 chipmunks in Rocky Mountain National Park. The mean of the sample weights was  $\bar{x} = 8.7$  oz, and the standard deviation is known to be  $\sigma = 1.4$  oz. Find a 90% confidence interval for the mean September weight of all chipmunks in Rocky Mountain National Park, and summarize your results.

The 90% confidence interval is \_\_\_\_\_, which means

---

---

29. The Smoky Bear Trucking Company claims that the average weight of a fully loaded moving van is 12,000 lb. The highway patrol decides to check this claim. A random sample of 30 Smoky Bear moving vans shows that the average weight is 12,100 lb. with a known standard deviation of  $\sigma = 800$  lb. Construct a hypothesis test to determine whether the average weight of a Smoky Bear moving van is more than 12,000 lb. Use a 5% level of significance.

The hypotheses are  $H_0$ : \_\_\_\_\_ and  $H_1$ : \_\_\_\_\_. Using the TI-84/83

function \_\_\_\_\_, the p-value is \_\_\_\_\_. So, at a 5% level of

significance I Reject  $H_0$  or Fail to Reject  $H_0$  (circle one), which means

---

---

Answer Key

1-23: BCEAC AABED CDACA ACABE ABC

24a.

Class Limits	Class Boundaries	Frequency	Midpoints
63-73	62.5-73.5	7	68
74-84	73.5-84.5	6	79
85-95	84.5-95.5	9	90
96-106	95.5-106.5	6	101
107-117	106.5-117.5	2	112

25.  $\bar{x} = 83.0$  min and  $s = 55.8$  min

26. a.  $7/18$  b.  $3/8$

27. 122.8, will get credit

28.  $P(8.39\text{oz} < \mu < 9.01\text{oz}) = 0.90$  means we are 90% confident that the mean weight of all Rocky Mountain chipmunks in September is between 8.39 oz and 9.01 oz.

29.