

Math 141

Fall 2009

Exam 3

Test Form A

On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.

(signature required)

- Read all directions.
- **BUBBLE TEST FORM A ON YOUR SCANTRON.**
- The scantrons will not be returned, so you **MUST** mark your answers on this exam.
- No partial credit on scantron questions.
- Be exact, if possible, on all workout problems. If rounding is needed, round to 4 decimal places.
- There are 3 pages with writing on both sides of every page.
- There is a 5 point deduction for any errors in following the directions.
- There will be a deduction of 5 points for any hand grading of your scantron.
- **NO LATE EXAMS!!** Penalty is (at least) 10 points off your score.

A standard deck of 52 cards has 13 cards in 4 different suits. The red suits are hearts and diamonds. The black suits are spades and clubs. The cards in each suit are A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K. The J, Q, and K are face cards.

There are 7 days in a week and 52 weeks in a year.

There are 12 inches in a foot, 3 feet in a yard, and 5280 feet in a mile.

The English alphabet has 26 letters. There are 5 vowels (a, e, i, o and u).

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1 – 16	/50
page 4	/12
page 5	/22
page 6	/16
TOTAL	/100

EXAM PART I - MULTIPLE CHOICE (4 points each)

1. Five mice from the same litter, all suffering from a vitamin A deficiency, are fed a dose of carrots. If the probability of recovery under such treatment is $\frac{2}{3}$, find the probability that exactly two recover. The answers are rounded to 4 decimal places.

- (A) 0.1646
- (B) 0.2099
- (C) 0.7901
- (D) 0.8354
- (E) none of these

2. $P(Z > 0.65) =$

- (A) 0.7422
- (B) 0.2420
- (C) 0.7580
- (D) 0.2578
- (E) none of these

3. A box contains 6 blue socks and 4 white socks. Two of the socks are chosen at random with no replacement. What is the probability that the two socks are the same color? Answers are reduced fractions.

- (A) $\frac{1}{3}$
- (B) $\frac{7}{15}$
- (C) $\frac{2}{15}$
- (D) $\frac{8}{9}$
- (E) none of these

4. A physics quiz consists of 7 questions, each with 3 possible answers. A score of 4 or more is needed for a passing grade. If each question is answered by guessing and there is exactly one correct answer for each question, what is the probability that a student who guesses on each question will pass the quiz? (Answers are rounded to 3 decimal places)

- (A) 0.016
- (B) 0.045
- (C) 0.128
- (D) 0.173
- (E) none of these

5. We are told the chance of rain on Monday is 20% and on Tuesday it is 50%. If these probabilities are independent, what is the chance that it will rain at least once?

- (A) 70%
- (B) 60%
- (C) 30%
- (D) 10%
- (E) none of these

6. Approximately 4.25% of the population is color blind and 50% of the population is female. If the probability of being color blind or female is 54%, what is the chance that a color blind person is male? Answers are rounded to the nearest percent.

- (A) 94%
- (B) 90%
- (C) 8%
- (D) 2%
- (E) none of these

Use the following information to answer 7 and 8. Also (for two points) circle the word honor on the cover page.

Students from different majors were asked to identify their computer preference in a recent fake survey. The table below summarizes the results of survey by indicating the number of students in each category.

	Agriculture	Business	Liberal Arts	Science or Engineering	Total
Mac	96	188	265	337	886
PC	272	390	191	304	1157
Total	368	578	456	641	2043

7. What is the probability that a Business major prefers a PC?

- (A) $\frac{390}{578}$ (B) $\frac{390}{1157}$
 (C) $\frac{390}{1735}$ (D) $\frac{390}{2043}$
 (E) none of these

8. What is the probability that a student is Liberal Arts major and prefers a Mac?

- (A) $\frac{265}{456}$ (B) $\frac{265}{886}$
 (C) $\frac{265}{1342}$ (D) $\frac{265}{2043}$
 (E) none of these

EXAM PART II - MULTIPLE CHOICE (2 points each)

9. The odds in favor of the Aggies beating t.u. are 8 to 1. What is the probability that the Aggies will lose?

- (A) $\frac{1}{8}$ (B) $\frac{1}{9}$ (C) $\frac{7}{8}$ (D) $\frac{8}{9}$ (E) None of these

10. Suppose the probability of a triathlete successfully completing his or her first Ironman-distance triathlon is 0.8. If a given Ironman race has 32 first-timers, can the binomial distribution be used to determine the probability that exactly 26 first-timers finish the race?

- (A) No, there are not a fixed number of trials.
 (B) No, there are more than two outcomes.
 (C) No, the probability of success in each trial is different.
 (D) Yes, all the criteria of a binomial experiment are met.
 (E) Cannot be determined from the given information.

11. A group of 20 puppies is weighed. Let X be the weight of a puppy in pounds. The random variable X is

- (A) Finite discrete (B) infinite discrete (C) continuous (D) Need more information to determine the answer

12. An urn has 4 red and 4 white balls in it. A ball is drawn and the color noted. Then the ball is replaced in the urn. Let X be the number of draws needed to get a red ball. The random variable X is

- (A) Finite discrete (B) infinite discrete (C) continuous (D) Need more information to determine the answer

13. A normal random variable is always a continuous random variable.

- (A) TRUE (B) FALSE (C) Need more information to determine the answer

14. The variance is the square root of the standard deviation.

- (A) TRUE (B) FALSE

Questions 15 and 16 use the histograms on the right.
Assume the vertical scale is the same for both histograms.

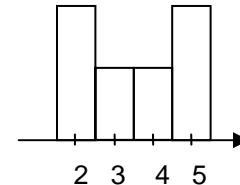
15. Which histogram has the larger standard deviation?
(A) J (B) K (C) They are the same
(D) Need more information to determine the answer

16. What is the mode or modes, if any, of histogram J?
(A) No mode (B) 2 and 5 (C) 3 and 4 (D) 3.5
(D) Need more information to determine the answer

Histogram J



Histogram K



17. The mean of a probability distribution is represented by
(A) μ (B) \bar{x} (C) either symbol (D) neither symbol (E) Need more information to determine the answer

Free response. Point values are as indicated. Show all your work!

17. (4 Points) An experiment consists of rolling a pair of dice and observing the uppermost number on each. Are the events “rolling exactly one 5” and “rolling a sum of 8” independent? Why or why not?

18. (8 pts) Suppose Math 141 exam 3 scores are normally distributed with a mean of 73 and a standard deviation of 12.

A. What is the probability that a student earns a C by scoring between 70 and 80?

B. What is the minimum exam grade required for a student to score in the 90th percentile?

C. What grades bracket the middle 50% of the students?

19. (7 points) There are 5000 flights per month between Lilliput and the Emerald City. There is a 65% chance that a randomly selected flight will arrive at its destination on time.

A. What is the expected number of on-time flights?

B. What is the standard deviation in the number of on-time flights?

C. What is the calculator command to use the normal curve approximation to the binomial distribution to estimate the probability that more than 4000 flights are on time this month?

20. (7 points) An investment firm tracks the economic success of small businesses by counting the number of full-time employees at some of the businesses in town. The table below shows the collected data.

Number of businesses	1	2	5	3	7
Number of employees	2	6	8	11	15

A. What is X ? (Circle one.)

Number of businesses Number of employees

Find the following for X :

B. Mean = _____

C. Median = _____

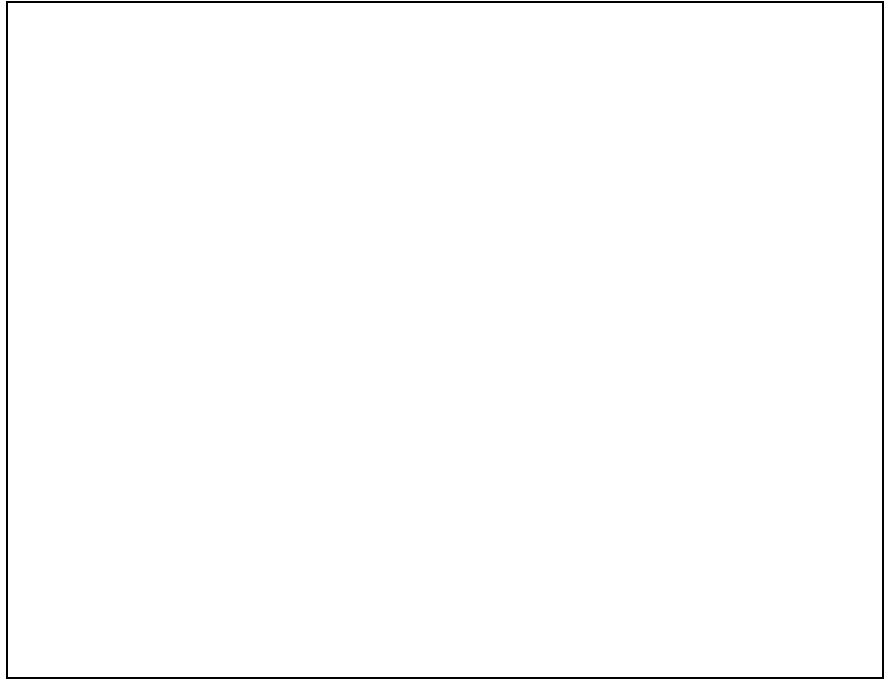
D. Mode = _____

E. Standard deviation = _____

21. (8 points) An art dealer plans to send a large sculpture collection on a national tour. If the entire collection completes the tour, the dealer will earn a net profit of \$80,000 from admission proceeds. If some of the pieces are damaged in transport, they will have to be excluded or sent for repairs, and the diminished collection will earn a net profit of only \$5,000. An insurance company is willing to insure the tour for \$65,000 in case of such damage, for a premium of \$20,000. If the probability of damage to the collection is 0.15, should the art dealer buy the insurance? Why or why not?

22. (10 points) Urn A contains 4 red, 4 green, and 5 white marbles. Urn B contains 2 green, and 5 white marbles. One marble is drawn from Urn A and if it is green, then it is placed in Urn B. Next, a marble is drawn from Urn B.

A. Draw a probability tree representing this experiment in the box on the right. Define any labels or abbreviations used the tree.



B. If the marble drawn from Urn B is white, what is the probability that the marble drawn from Urn A was white?

C. If the marble drawn from Urn A was green, what is the probability that the marble drawn from Urn B is green?

23. (6 points) Find the probability distribution table for the number of hearts in a hand of 3 cards.