

Name: _____

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Math 214: Introduction to Statistics
Spring Semester 1999
Exam 1
February 8, 1999

This Examination consists of 16 multiple choice problems worth 6 points each. You start with 4 points. Record your answers by placing an \times through one letter for each problem on this answer sheet.

This booklet consists of 8 sheets of paper including the front cover and one blank page at the end. Calculators, books, and notes are not allowed.

Answers to Multiple Choice Problems

- | | |
|-------------------------------|--------------------------------|
| 1. (a) (b) (c) (d) (e) | 9. (a) (b) (c) (d) (e) |
| 2. (a) (b) (c) (d) (e) | 10. (a) (b) (c) (d) (e) |
| 3. (a) (b) (c) (d) (e) | 11. (a) (b) (c) (d) (e) |
| 4. (a) (b) (c) (d) (e) | 12. (a) (b) (c) (d) (e) |
| 5. (a) (b) (c) (d) (e) | 13. (a) (b) (c) (d) (e) |
| 6. (a) (b) (c) (d) (e) | 14. (a) (b) (c) (d) (e) |
| 7. (a) (b) (c) (d) (e) | 15. (a) (b) (c) (d) (e) |
| 8. (a) (b) (c) (d) (e) | 16. (a) (b) (c) (d) (e) |

I have not violated the Honor Code in this examination.

Signature: _____

Score: _____

1. How many 4-digit numbers can be formed from the digits 2, 4, 5, 6, 8, and 9 if each digit can be used only once?
 - (a) $6!$
 - (b) 6^4
 - (c) P_4^6
 - (d) $4!$
 - (e) 24

2. Assume A and B are events, i. e. subsets of a sample space S . Let P be the probability defined on S . It is known that $P(A) = 0.6$, $P(B) = 0.5$, and $P(A|B) = 0.8$. Calculate $P(AB)$.
 - (a) 0.03
 - (b) 0.3
 - (c) 0.1
 - (d) 0.5
 - (e) 0.4

3. How many ways are there to select 3 candidates from 8 equally qualified recent graduates for 3 identical openings in an accounting firm?
 - (a) P_3^8
 - (b) $\binom{8}{3}$
 - (c) 8^3
 - (d) P_8^3
 - (e) 3^8

4. Groucho has 6 pairs of socks: blue, yellow, green, red, white, and purple. These 12 socks are all mixed together in a drawer, and 3 are selected randomly. What is the probability that 2 of the 3 selected socks match?

(a) $\frac{3}{12}$

(b) $\frac{6 \cdot 10}{\binom{12}{3}}$

(c) $\frac{3}{\binom{12}{3}}$

(d) $\frac{\binom{12}{2}}{\binom{12}{3}}$

(e) $\frac{6}{P_3^{12}}$

5. Maria has in her pocket 3 quarters and 10 nickels. She reaches into her pocket and selects randomly 8 coins. What is the probability that the coins she has pulled out add up to 60 cents?

(a) $\frac{\binom{3}{1} \cdot \binom{10}{7}}{\binom{13}{8}}$

(b) $\frac{\binom{3}{2} \cdot \binom{10}{2}}{\binom{13}{8}}$

(c) $\frac{\binom{3}{2} \cdot \binom{10}{2}}{\binom{13}{4}}$

(d) $\frac{\binom{3}{1} \cdot \binom{10}{7}}{\binom{13}{8}} + \frac{\binom{3}{2} \cdot \binom{10}{2}}{\binom{13}{4}}$

(e) $\frac{3}{13} \cdot \frac{10}{12} \cdot \frac{9}{11} \cdot \frac{8}{10} \cdot \frac{7}{9} \cdot \frac{6}{8} \cdot \frac{5}{7} \cdot \frac{4}{6}$

6. How many ways can 5 (identical) doughnuts be given to 12 persons, if each person is allowed to receive several doughnuts.
- (a) P_5^{12}
 - (b) $\frac{12!}{5!}$
 - (c) 5^{12}
 - (d) $\binom{12}{5}$
 - (e) 12^5
7. From statistics about family summer vacations with a camper it is known that in a typical summer 25% experience mechanical problems, 30% will receive a ticket for committing a traffic violation, and 60% will have neither of these mishaps. What is the percentage of families experiencing both kinds of trouble?
- (a) 10%
 - (b) 15%
 - (c) 0%
 - (d) 5%
 - (e) 20%
8. Suppose that at a certain college 60% of the students are male. It is known that 25% of the male students smoke, while 30% of the female students smoke. What is the fraction of smoking students at that college?
- (a) 55%
 - (b) 28%
 - (c) 29%
 - (d) 27%
 - (e) 26%

9. A bike-store sells mountain bikes and racing bikes. Based on long-range sales, 70% of purchasing customers buy mountain bikes while 30% buy racing bikes. Of those that buy a mountain bike, 40% also buy a helmet. But 60% of racing bike buyers also purchase a helmet. A randomly selected customer buys a helmet and a bike. What is the probability that it is mountain bike?

(a) 0.46

(b) 0.7

(c) $\frac{0.28}{0.46}$

(d) $\frac{0.28}{0.7}$

(e) 0.28

10. A discrete random variable X has the following probability distribution

X	-2	0	1	3
$p(x)$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{4}$

Find the expected value $E(X)$.

(a) $\frac{13}{8}$

(b) $\frac{3}{4}$

(c) $\frac{29}{8}$

(d) 2

(e) $\frac{5}{8}$

11. A random variable X has expected value $E(X) = 5$ and variance $V(X) = 2$. What is $V(4X - 3)$?

(a) 8

(b) 29

(c) 32

(d) 5

(e) 80

12. A discrete random variable Y has probability distribution $\frac{Y}{p(y)} \left| \begin{array}{ccc} -1 & 0 & 3 \\ \frac{2}{5} & \frac{1}{5} & \frac{2}{5} \end{array} \right.$. The expected value is $E(Y) = \frac{4}{5}$. Find the standard deviation $\sigma(Y)$.

(a) $\frac{84}{25}$

(b) 4

(c) 2

(d) $\sqrt{\frac{84}{25}}$

(e) $\sqrt{\frac{64}{25}}$

13. The set $\{0, 1, \dots, 9\}$ is used to build 9-digit social security numbers. Repetition of digits is allowed. Assume that all digits are equally likely when creating the numbers. What is the probability that a randomly selected SSN has all digits equal (like 555555555), but is not the number 000000000?

(a) $\frac{9}{10^9}$

(b) $\frac{9}{10!}$

(c) $\frac{\binom{10}{9}}{10^9}$

(d) $\frac{1}{10^9}$

(e) $\frac{9 \cdot \binom{10}{9}}{10^9}$

14. A CBS News/New York Times Poll, taken on February 1, 1999, shows that 56% of those questioned disapprove of the way the Senate is handling the impeachment trial against President Clinton. Assume that this poll is representative for the adult US-population. For 4 randomly selected adults in the US, let X denote the number of those disapproving of the Senate's way of handling the impeachment trial. What is $P(X = 1)$?

(a) $(0.56)(0.44)^3$

(b) $\binom{4}{1}(0.56)^3(0.44)$

(c) $\binom{4}{1}(0.56)(0.44)^3$

(d) $P_1^4(0.56)(0.44)^3$

(e) $\frac{(0.56)(0.44)^3}{4}$

15. Let A and B be two independent events having probabilities $P(A) = 0.3$ and $P(B) = 0.4$. What is $P(AB)$?

(a) 0

(b) 0.7

(c) 1.2

(d) 0.12

(e) 0.3

16. A local company manufactures telephone wire. The average length of the wire is 52 inches with a standard deviation of 6.5 inches. At least, what percentage of the telephone wire from this company exceeds 39 inches?

(a) 70%

(b) 75%

(c) 80%

(d) 85%

(e) 90%