

LEMOYNE-OWEN COLLEGE
DIVISION OF NATURAL SCIENCES, MATHEMATICS AND COMPUTER SCIENCE

MATH 120
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Midterm Test

Show your work

Name: _____

1. For the following problems, decide whether each of them is an example of **inductive** or **deductive** reasoning. (4%, 2 points each)

(a) Tony Smith hit home runs the last four times at bat, so he'll hit a home run the next time he bats.

(b) _____
Since all weight lifters are strong and Sam is a weight lifter, Sam is strong.

2. Find the most probable next number in the list. (9%, 3 points each)

(a) 4, 6, 8, 10, 12, _____

(b) 2, 4, 8, 16, 32, _____

(c) Use the method of successive differences to find the next term in the sequence.
3, 15, 35, 68, 119, 193,

3. Find the sum of each sequence. (12%, 4 points each)

(a) $1+2+3+4+\dots+45=$ _____

(b) $1+3+5+7+9+\dots+143=$ _____

(c) $1^3+2^3+3^3+\dots+12^3=$ _____

4. What is the ones digit of 4^{50} ? (5%)
5. During a single day, the Ohio state lottery paid \$538,247.50 to winners of one daily game. Sales of numbers for that game totaled \$1,491,651.50. The state kept about _____ from sales for that game that day. Choose the best answer from below. (5%)
- (a) \$500,000 (b) \$100,000 (c) \$1,000,000 (d) \$2,000,000
6. I am thinking of a number. If I double it, subtract 9 from the result, square that result, and then add 15, the final result is 40. What is my number? (5%)

7. Let $U = \{1, 3, 5, 7, 9, 11, 13\}$,

$$M = \{1, 3, 5, 7, 9\},$$

$$N = \{1, 3, 5\},$$

$$P = \{3, 9, 11\}.$$

Find each of the following sets. (30%, 3 points each)

(a) $\phi \cup M =$ _____

(b) $N \cap P =$ _____

(c) $M' \cap N$

(d) $M \cup N \cap P$

(e) $M - (N' \cup P)$

(f) Is the following statement true: $3 \in (P \cap N)$? Why?

(g) Is the following statement true: $\{3, 5\} \subseteq M$? Why?

(h) Find the number of subsets of M .

(i) List all subsets of $\{\text{Up}, \text{Down}\}$.

(j) Find the number of elements in $A \cup B$, $n(A \cup B)$, if $n(A) = 15$, $n(B) = 12$, and $n(A \cap B) = 5$.

8. Write a **negation** for each of the following statements: (8%, 2 points each)

(a) I took it and I lost it.

(b) All basketball players are tall.

(c) Some nights are not scary.

(d) If Janet passes the exam, she passes the course.

9. Let p represent the statement “**he has a dog**,” and let q represent the statement “**he has a cat**.” Translate each *symbolic* compound statement into *words*. (4%, 2 points each)

(a) $\sim p \vee q$ _____

(b) $p \wedge q$ _____

10. Let p represent the statement “**I go**,” and let q represent the statement “**he stays**.” Write each of the following in symbols. (4%, 2 points each)

(a) If I go, he stays. _____

(b) I do not go and he stays. _____

11. Decide whether the following compound statements are *true* or *false*: (4%, 2 points each)

(a) $(\phi \subseteq U) \wedge (\phi \cup U = \phi)$ _____

(b) $(10 > 5) \vee (1 + 1 = 2)$ _____

12. Construct a **truth table** for $(\sim p \vee q) \rightarrow (p \wedge \sim q)$. (10%)

p	q	$\sim p$	$\sim p \vee q$	$\sim q$	$p \wedge \sim q$	$(\sim p \vee q) \rightarrow (p \wedge \sim q)$
T	T					
T	F					
F	T					
F	F					

Additional Problem:

A survey of 150 sophomores at LeMoyné-Owen College produced the following results:

- 61 like French
- 54 like math
- 57 like science
- 9 like both French and math
- 15 like both math and science
- 17 like both French and science
- 5 like all three subjects.

Find the number of students:

- (a) who like none of these subjects
- (b) who like math only
- (c) who like math or science, but not both
- (d) who don't like math.