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

MATH 120 Thursday
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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) All ducks can swim. This is a duck, so it can swim.

   _____

   (b) Since the Saints have won five games in a row, the term will win this week's game.

   _____

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

   (a) 3, 6, 12, 24 48, …… _____

   (b) 2, 9, 16, 23, 30, …… _____

   (c) Use the method of successive differences to find the next term in the sequence.
   2, 11, 23, 40, 64, 97, ……

3. Find the sum of each sequence. (12%, 4 points each)
   (a) 1+2+3+4+…+55=_____

   (b) 1+3+5+7+9+…+121=_____

   (c) $1^3+2^3+3^3+...+10^3$=_____

4. What is the ones digit of 4^{85} ? (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 $U = \{2, 3, 5, 7, 9, 10, 12, 15\}$,

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

$N = \{10, 12, 15\}$,

$P = \{2, 10, 12\}$.

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: $2 \in (P \cap N)$? 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 $\{\text{Yes, No}\}$.

(j) Find the number of elements in $A \cup B$, $n(A \cup B)$, if $n(A) = 15$, $n(B) = 12$, and $n(A \cap B) = 7$.

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

   (a) He is quick or he is big.

   _____

   (b) All football players are strong.

   _____

   (c) Some days are not hot.

   _____

   (d) If the temperature gets colder, the skating will be excellent.

   _____

9. Let ***p*** represent the statement "**the temperature is above 80°,**" and let ***q*** represent the statement "**I would go to the beach.**" 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 "**it is a dog**," and let ***q*** represent the statement "**it is a mammal**." Write each of the following in symbols. (4%, 2 points each)

   (a) If it is a dog, it is a mammal. _____

   (b) It is a dog and it is a mammal. _____

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

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

   (b) $(10 > 5) \vee (1 + 1 = 3)$ _____

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 LeMoyne-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.