

4. What is the ones digit of 8^{99} ? (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 $U = \{a, b, c, d, e, f, g, h, i\}$,

$$M = \{a, b, c, d, e, f\},$$

$$N = \{d, e, f, g, h\},$$

$$P = \{a, b, c\}.$$

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: $a \in (P \cap N)$? Why?

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

(h) Find the number of subsets of M .

(i) List all subsets of $\{Head, Tail\}$.

(j) Find the number of elements in $A \cup B$, $n(A \cup B)$, if $n(A) = 15$, $n(B) = 10$, and $n(A \cap B) = 7$.

8. Write a **negation** for each of the following statements: (8%, 2 points each)
- (a) He didn't pass the test or he's going to law school.

- (b) No numbers are prime.

- (c) Some days are hot.

- (d) If he tried, he would win.

9. Let p represent the statement "**it is too early to decide**," and let q represent the statement "**my decision is to go with it**." Translate each *symbolic* compound statement into *words*. (4%, 2 points each)
- (a) $p \vee \sim q$ _____
- (b) $p \wedge q$ _____
10. Let p represent the statement "**the Bulls win**," and let q represent the statement "**Jordan has played**." Write each of the following in symbols. (4%, 2 points each)
- (a) If the Bulls win, Jordan has played. _____
- (b) The Bulls win or Jordan has played. _____
11. Decide whether the following compound statements are *true* or *false*: (4%, 2 points each)
- (a) $(\phi \subseteq U) \vee (\phi \cap U = \phi)$ _____
- (b) $(10 > 5) \wedge (1 + 1 = 3)$ _____
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	F	T	F	F	T
T	F	F	T	T	T	F
F	T	T	T	F	F	T
F	F	T	T	T	F	T

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.