LIBERAL ARTS MATH I EXAM 1 MA   NAME _____

Show all work on this test or on separate paper. Turn in ALL work sheet.
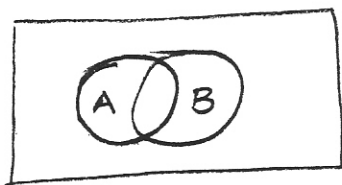   CIRCLE YOUR ANSWERS!

In 1-6, let $U = \{1,2,3,4,5,6,7,8,9,10,11,12\}$ $D = \{9,10,11,12\}$
       $E = \{2,4,6,8,10,12\}$, $F = \{1,3,5,7,9\}$, $G = \{5,6,7\}$
       Find the following.

1. E' 2. $G \cup F$ 3. $G \cap F$
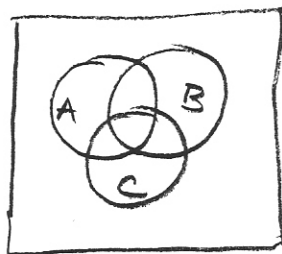
4. $(D \cap F)'$ 5. $(G' \cap F) \cup D$ 6. $D - E$

In 7-12, shade each of the following Venn Diagrams
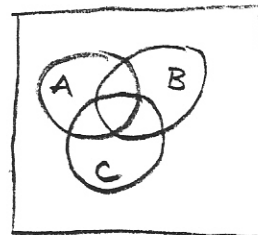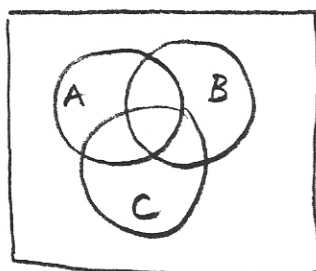
7. $(A' \cap B)'$ 8. $A \cap (B \cap C)$ 9. $B' \cup C$

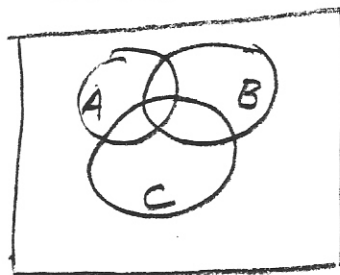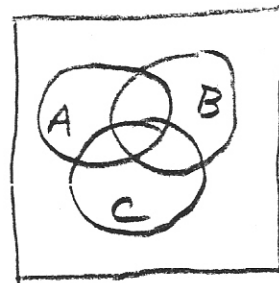

10. $A' \cap (B' \cup C)$ 11. $B \cap C'$ 12. $A - (B \cap C')$

In 13-16, label the figure and answer the questions   13.
   50 like math; 39 like history; 39 like English
   18 like history and English; 25 like math and English
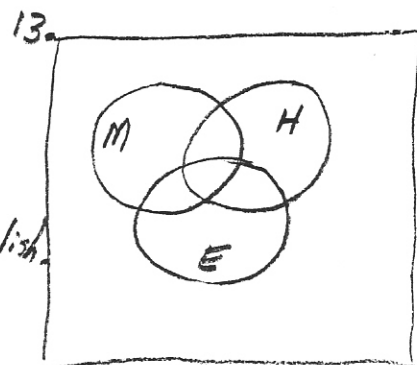   22 like math and history; 10 like math, history, and English.
   12 don't like any of these subjects.

14. How many like history but not math?
15. How many like history or math?
16. How many total were in this survey?

In 17-22, give the negation for each:

17. All aliens have green hair.

18. Some flowers make me sneeze.

19. Every cat loves catnip

20. No one got an A on the test.

21. If Amy passes the exam, then she passes the course.

22. Sam will go or Jen will stay

In each of the following, assume that q and r are false with p true. Find the truth value of each statement.

23. $q \rightarrow p$

24. $p \rightarrow (q \wedge r)$

25. $(\sim r \vee q) \rightarrow (q \wedge p)$

In 26-27, construct truth tables for

26. $(p \vee \sim q) \rightarrow \sim q$

27. $q \rightarrow (p \vee \sim q)$

In 28-31, write each statement in the form of if...then.

28. All football players are strong

29. Having a job is necessary for obtaining a loan.

30. I don't have any money or I'd be shopping.

31. Two triangles are similar only if corresponding angles are equal.

Given   If it rains, then we can't go swimming.

32. Converse:

33. Inverse:

34. Contrapositive:

35. Negation:

36. Which of the above is equivalent to the original statement? _____

In 37- ___, use Euler diagrams or logical principles to determine whether the argument is valid or invalid. NAME the PRINCIPAL or FALLACY!

37. Some dogs are friendly
Spot is a dog
∴ Spot is friendly

38. If it snows, then we go sledding
It snows
∴ we go sledding

39. If it snows, then we go sledding
We go sledding
∴ It snows.

40. If you study, then you do well on the test.
You do not study.
∴ You do not do well on test.

41. If I loved you, I'd tell you
If I told you, you wouldn't believe it
∴ If I loved you, you wouldn't believe it.

42. If A, then B
Not B
∴ Not A

In 43-48, select the correct answer (MULTIPLE CHOICE):

43. Select the statement that is the negation of the statement "I am not hungry and I am thirsty."
   A. I am hungry and I am not thirsty.
   B. If I am not hungry, then I am thirsty.
   C. If I am hungry, then I am thirsty.
   D. I am hungry or I am not thirsty.

44. Select the statement below that is logically equivalent to "It is not true that Jim is playing golf or Mary is playing tennis."
   A. Jim is not playing golf and Mary is not playing tennis.
   B. Jim is not playing golf or Mary is not playing tennis.
   C. Jim is playing golf and Mary is not playing tennis.
   D. If Jim is not playing golf, then Mary is not playing tennis.

45. Select the statement below that is logically equivalent to "If Jones is in Los Angeles, then he is in Calif."
   A. If Jones is in Calif, then he is in Los Angeles.
   B. If Jones is not in Los Angeles, then he is not in Calif.
   C. If Jones is not in Calif, then he is not in Los Angeles.
   D. Jones is in Los Angeles, or he is in Calif.

46. Select the conclusion that will make the following argument valid. "If I pass the CLAST, then I will get my AA degree. If I get my AA degree, then I will attend the university."
   A. If I do not pass the CLAST, then I will not attend the university.
   B. If I pass the CLAST, then I will not attend the university.
   C. If I get my AA degree, then I pass the CLAST.
   D. If I pass the CLAST, then I will attend the university.

47. Select the rule of logical equivalence that directly (in one step) transforms statement "i" into statement "ii."
   i.   If x^2 is even, then x is even.
   ii.   If x is not even, then x^2 is not even.
   A. "Not (p and q)" is equivalent to "(not p) or (not q).
   B. "If p, then q" is equivalent to "(not p) or q."
   C. Correct equivalence rule is not given.
   D. "If p, then q" is equivalent to "if not q, then not p."

48. Study the information given below. If a logical conclusion is given, select that conclusion.

   "If I pass this test, then I will graduate. I pass this test or I get a job. I did not get a job."
   A. I did not graduate.
   B. I did graduate.
   C. I did not pass this test.
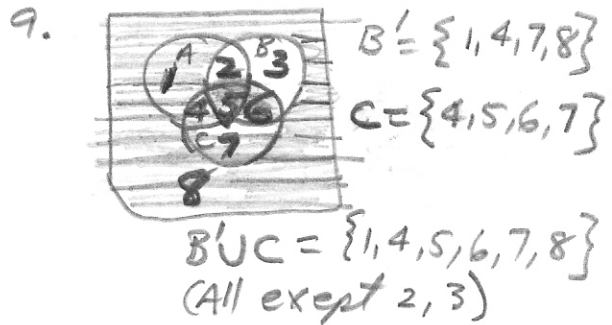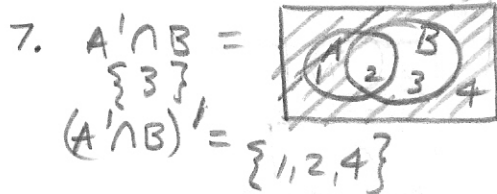   D. None of the above is warranted.

LIBERAL ARTS MATH I EXAM LOGIC (MA) SOLUTIONS.

1. $E' = \{1, 3, 5, 7, 9, 11\}$

2. $G \cup F = \{1, 3, 5, 6, 7, 9\}$
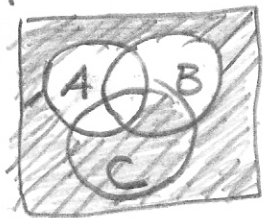
3. $G \cap F = \{5, 7\}$

4. $D \cap F = \{9\}$

5. $G' = \{1, 2, 3, 4, 8, 9, 10, 11, 12\}$

$(D \cap F)' = \{1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12\}$ $G' \cap F = \{1, 3, 9\}$ $(G' \cap F) \cup D = \{1, 3, 9, 10, 11, 12\}$
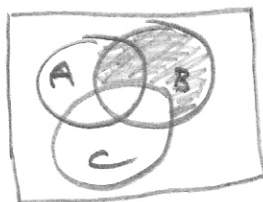
6. $D - E =$ start with $\{9, 10, 11, 12\}$
take away $10, 12$, $= \{9, 11\}$

7. $A' \cap B = \{3\}$
$(A' \cap B)' = \{1, 2, 4\}$

8.

$A \cap (B \cap C)$

9.

$B' = \{1, 4, 7, 8\}$
$C = \{4, 5, 6, 7\}$

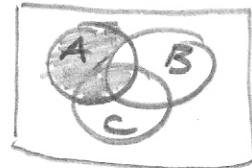$B' \cup C = \{1, 4, 5, 6, 7, 8\}$
(All except 2, 3)

10. $A' \cap (B' \cup C)$ (See #9)
$\{3, 6, 7, 8\} \cap \{1, 4, 5, 6, 7, 8\}$
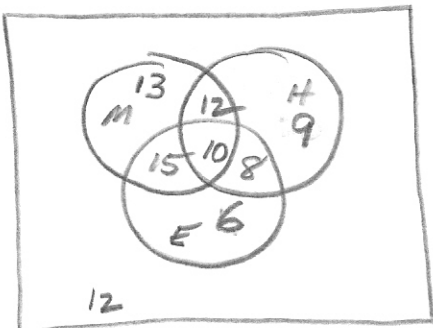$\{6, 7, 8\}$

11. $B \cap C'$
B and not C

12. $A - (B \cap C')$
A take away the regions of #11.

13.

14. $8 + 9 = 17$

15. $50 + 9 + 8 = 67$

16. $50 + 9 + 8 + 6 + 12 = 85$

17. Some aliens do <u>not</u> have green hair.
18. <u>No</u> flowers make me sneeze.
19. Some cats do <u>not</u> like catnip.
20. Some~~one~~ gets a A on the test.
21. Amy passes the test <u>AND</u> she does not pass course.
22. Sam will <u>not</u> go and Jan will <u>not</u> stay.

23. $F \rightarrow T = T$

24. $T \rightarrow (F \wedge T)$
$T \rightarrow F = F$

25. $(T \vee F) \rightarrow (F \wedge T)$
$T \rightarrow F = F$

$\begin{array}{r} 18 \\ -10 \\ \hline 8 \end{array}$ $\begin{array}{r} 25 \\ -10 \\ \hline 15 \end{array}$ $\begin{array}{r} 22 \\ -10 \\ \hline 12 \end{array}$ $\begin{array}{r} 15 \\ 10 \\ 12 \\ \hline 37 \end{array}$ $\begin{array}{r} 50 \\ -37 \\ \hline 13 \end{array}$

$\begin{array}{r} 12 \\ 10 \\ 8 \\ \hline 30 \end{array}$ $\begin{array}{r} 39 \\ -30 \\ \hline 9 \end{array} H$ $\begin{array}{r} 15 \\ 10 \\ 8 \\ \hline 33 \end{array}$ $\begin{array}{r} 39 \\ -33 \\ \hline 6 \end{array} E$

26.

P	Q	~q	p∨~q	~q	(p∨~q) → ~q
T	T	F	T	F	T → F = F
T	F	T	T	T	T → T = T
F	T	F	F	F	F → F = T
F	F	T	T	T	T → T = T

27.

P	Q	p∨~q	q → (p∨~q)
T	T	T	T → T = T
T	F	T	F → T = T
F	T	F	T → F = F
F	F	T	F → T = T