# Math 102
## Test 2 Review Problems

Show your work.

1. Symbolize the following argument, and then determine if the argument is valid or invalid via a truth table or proof..

I did <u>not</u> play cards or I was dealt a full house.
If I was dealt a full house, then I won the hand.
Therefore, I did not play cards or I won the hand.

$\sim p \lor h$

$h \to w$

$\therefore \sim p \lor w$

Valid ✓

| P | h | w | $(\overset{1}{\sim}p\overset{2}{\lor}h)$ | $\overset{4}{\land}$ | $(h\overset{3}{\to}w)$ | $\overset{7}{\to}$ | $(\overset{5}{\sim}p\overset{6}{\lor}w)$ |
|---|---|---|---|---|---|---|---|
| T | T | T | F T T | T | T | T | F T T |
| T | T | F | F F T | F | F | T | F F F |
| T | F | T | F F F | F | T | T | F T T |
| T | F | F | F F F | F | T | T | F F F |
| F | T | T | T T T | T | T | T | T T T |
| F | T | F | T T T | F | F | T | T T F |
| F | F | T | T T F | T | T | T | T T T |
| F | F | F | T T F | T | T | T | T T F |

2. Determine if the following is valid or invalid.

All students who complete their math homework will do well on the test.
Susan did well on the test.

∴ Susan did all her math homework.

Invalid

Did well on Test

completed math home-work

X ← Susan, but she did <u>not</u> do her homework.
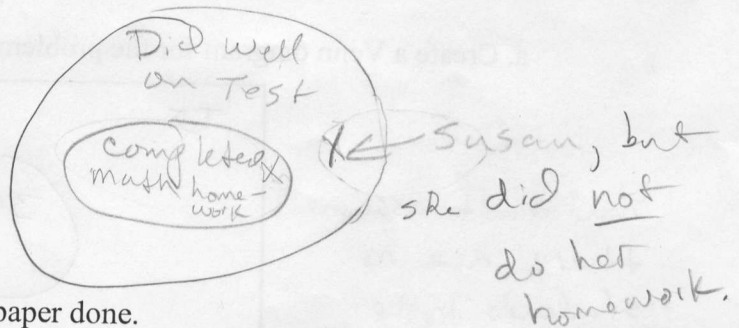
3. Rewrite in if … then form.

a. I will go to class only if I get my English paper done.

If I go to class, then I got my English paper done.

b. To play on a college sports team it is necessary that you are passing all your classes.

If you play on a college sports team, then you are passing all your classes.

4. Is $p \to (q \land \sim p)$ logically equivalent to $(q \lor p) \leftrightarrow q$?

| P | q | p | $\overset{3}{\to}$ | $(q\overset{2}{\land}\overset{1}{\sim}p)$ |
|---|---|---|---|---|
| T | T | | F | F F F |
| T | F | | F | F F F |
| F | T | | T | T T T |
| F | F | | T | F F T |

| P | q | $(q\overset{1}{\lor}p)$ | $\overset{2}{\leftrightarrow}$ | q |
|---|---|---|---|---|
| T | T | T | T | T |
| T | F | T | F | F |
| F | T | T | T | T |
| F | F | F | T | F |

Not Logically equivalent

5. Identify the form of the argument and state whether the argument is valid or invalid.

If you eat well, you will <u>be well</u>.
<u>If you are well, you will be happy.</u>
Therefore, if you eat well, you will be happy.

$e \rightarrow w$
$w \rightarrow h$
$\overline{e \rightarrow h}$

A. **Disjunctive Syllogism**     B. **Law of Syllogism**

C. **Fallacy of the Converse**     D. **Law of Contraposition**
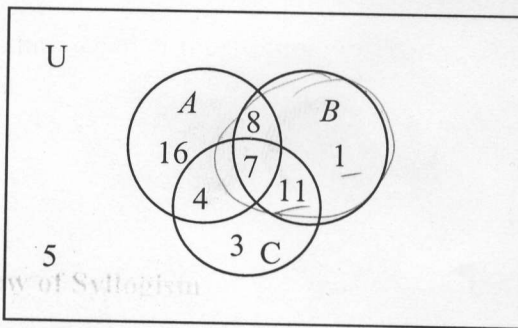
6. Which of the following symbols could be used $\in, \subseteq, \subset, \notin, \nsubseteq, \not\subset$ to make each statement true.

a. $\{0, 1, 2, 3, \ldots\}$ $\underline{\nsubseteq}$ N

or $\not\subset$

b. $\{1, 2\}$ $\underline{\subseteq}$ $\{-1, 0, 1, 2\}$

or $\subset$

c. ¼ $\underline{\in}$ R

↑ element

7) Use the diagram below to find the cardinality for each problem given that the numbers indicate **how many elements are in each region** of the Venn diagram
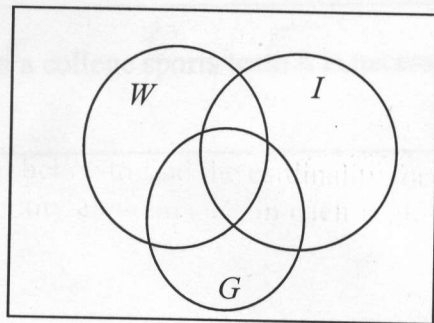


a. $n(B - A) =$ __12__
   11 + 1

b. $n(C \cup A) - B =$ __23__

c. $n(A' \cup B') =$ __40__
   5 + 3 + 11 + 1  16 + 4 + 3 + 5

8. Shade W ∪ G'



Assignment for Wed 2/24

Complete Chap 2 Review #1, 2, 3, 7, 8, 10, 11, 12, 14.b, 19, 20, 21, 23 on pp. 134-135

& Chapter 1 Test # 14, 17, 19, 21 on p. 68