HW-2.3

1. (34 *points*) Prove that the following argument form is valid using only the standard valid argument forms and logical equivalences. **Make sure you arrange your arguments in the given order 1., 2., 3., 4., 5. & then 6.:**

A. $p \rightarrow (t \wedge r)$
B. $\sim q$
C. $u \vee \sim p$
D. $(u \wedge r) \rightarrow \sim s$
E. $\sim p \rightarrow q$
∴ $\sim s$

Practice Problem:
A. $t \rightarrow s$
B. $(\sim t \vee p) \rightarrow q$
C. $\sim s$
D. $r \vee \sim p$
E. $(\sim t \wedge q) \rightarrow \sim r$
∴ $\sim p$

1.

_____ by _____

_____ by _____

∴_____ by _____

2.

_____ by _____

_____ by _____

∴_____ by _____

3.

_____ by _____

_____ by _____

∴_____ by _____

4.

_____ by _____

∴_____ by _____

5.

_____ by _____

_____ by _____

∴_____ by _____

6.

_____ by _____

_____ by _____

∴_____ by _____

2.   (24 *points*) Do as directed:

   a) (2 *points*) Define what is means to say an argument (**not** argument *form*) is valid.

   b) (4 *points*) Consider the following argument form where A. & B. are the premises and C. is the conclusion.

     A. $p \longrightarrow (\sim q \lor r)$

     B. $p \land \sim q$

     C. $\therefore \ \sim r$

     Define what it means for the above argument *form* to be valid.

   c) (18 *points*) Construct a single complete truth table with A, B, & C (in that order) as defined in part b) above in the last 3 columns. Then determine if the argument form given in b) is valid or invalid and justify your answer using **only the definition** of a valid argument form. Use as many rows & columns as you need in the following table.

3. (62 *points*) For each of the following arguments, define the statement variables p, q & r etc. and write its argument form in the box provided. State if the argument is valid or invalid and <u>prove your answer without using the truth tables</u>. **USE COMPLETE SENTENCES**.

a) Premise 1: If my son finished his food, then he got the dessert.
    Premise 2: My son didn't finish his food.
    Conclusion: ∴ My son didn't get the dessert.

    $p =$ _____

    $q =$ _____

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____

Answer:

b) Let x & y be fixed real numbers:
    Premise 1: If $xy = 0$, then either x or y is zero.
    Premise 2: Either x or y is zero.
    Conclusion: ∴ $xy = 0$.

    $p =$ _____

    $q =$ _____

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____

Answer:

c) Premise 1: If I studied hard, then either I got A or took a vacation.
    Premise 2: I neither got A nor took a vacation.
    Conclusion: ∴ I didn't study hard.

    $p =$ _____

    $q =$ _____

    $r =$ _____

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____

Answer:

d) Premise 1: Melanie either took the quiz or provided documentation for absence.

Premise 2: Melanie provided documentation for absence.

Conclusion:∴ Melanie did not take the quiz.

p =_____

q =_____

Answer:

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____

e) Premise 1: If 4 GB is better than no memory at all, then we will either buy more memory or buy a new computer.

Premise 2: If we will buy a new computer, then we will not buy more memory.

Conclusion: ∴ If 4 GB is better than no memory at all, then we will buy a new computer.

p =_____

q =_____

r =_____

Answer:

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____

f) Premise 1: If I studied hard, then I got A.

Premise 2: If I got A, then I took a vacation.

Conclusion: ∴ I took a vacation.

p =_____

q =_____

r =_____

Answer:

Argument form
Premise 1:_____
Premise 2:_____
Conclusion: ∴_____