

Logic: Analyzing Arguments
Worksheet Solutions

1. Use truth tables to determine if each argument is valid or invalid. Rewrite the arguments using symbolic logic if necessary.

- (a) All natural number are integers.
All integers are rational numbers.

All natural numbers are rational.
Valid by reasoning of transitivity.

- (b) If Tom Brady plays, then the Patriots will win.
The Patriots win.

Tom Brady plays.
invalid by Fallacy of the converse

- (c) $(p \wedge r) \rightarrow (p \wedge q)$
 $r \rightarrow p$

$q \rightarrow r$
Invalid. False when $p, q = T, r = F$ and $q = T, p, r = F$. Use a Truth Table.

$$(d) \frac{(p \rightarrow q) \vee (q \rightarrow r)}{p \vee r}$$

$$r \rightarrow p$$

Invalid. False atleast when $p, r = T, q = F$. Use a truth table.

$$(e) \frac{(r \wedge p) \rightarrow (r \vee q)}{q \wedge p}$$

$$r \vee p$$

Valid

- (f) If I've got you under my skin then you are deep in the heart of me. If you are deep in the heart of me, then you are not really a part of me. You are deep in the heart of me or you are really a part of me. Therefore, if I've got you under my skin, then you are really a part of me.

p: I've got you under my skin.

q: You are deep in the heart of me.

r: You are really a part of me.

$p \rightarrow q$

$q \rightarrow \sim r$

$q \vee r$

—————

$p \rightarrow r$

Invalid.

- (g) Bobby loves to watch movies. If Kelly like to jog, then Bobby does not love to watch movies. If Kelly does not like to jog, then Chris rides a horse. Therefore, Chris rides a horse.

p: Bobby loves to watch movies.

q: Kelly likes to jog.

r: Chris rides a horse.

p

$q \rightarrow \sim p$

$\sim q \rightarrow r$

—————

r

Valid