

Quiz #2 10/16/09

Name: _____

Directions: Make sure to read each problem carefully. To receive full credit, you must show all of your work.

Problem 1. (5 points) Are the following logical statements equivalent?

$$S : [p \rightarrow (q \vee r)] \quad T : [(-p \wedge q) \rightarrow r]$$

Make sure to give sufficient evidence either way.

p	q	r	$q \vee r$	$p \rightarrow (q \vee r)$	$-p$	$-p \wedge q$	$(-p \wedge q) \rightarrow r$
0	0	0	0	1	1	0	1
0	0	1	1	1	1	0	1
0	1	0	1	1	1	1	0
0	1	1	1	1	1	1	1
1	0	0	0	0	0	0	1
1	0	1	1	1	0	0	1
1	1	0	1	1	0	0	1
1	1	1	1	1	0	0	1

Problem 2. (5 points) Determine the number of integer solutions of

$$x_1 + x_2 + x_3 + x_4 = 32$$

if $x_1, x_2 \geq 5$ and $x_3, x_4 \geq 7$.

If we think about distributing 32 pennies to 4 people, then $5 + 5 + 7 + 7 = 24$ already have been distributed. Thus there are 8 pennies left to distribute among 4 people. There are

$$\binom{8+4-1}{8} = \binom{11}{8}$$

ways to do this.

The following statements will be used in problems 3 and 4.

p: I finish writing my computer program before lunch.

q: I shall play tennis this afternoon.

r: The sun is shining.

s: The humidity is low.

Problem 3. (3 points) Write the following statement in symbolic form.

“If I don’t finish writing my computer program before lunch and the sun is shining, then I shall not play tennis this afternoon.”

$$\boxed{(-p \wedge r) \rightarrow \neg q}$$

Problem 4. (3 points) Write the following symbolic statement as an English sentence.

$$q \leftrightarrow (r \wedge \neg s)$$

I shall play tennis this afternoon if and only if the sun is shining and the humidity is not low.