Discrete Math
Quiz 6

Name:_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Write down a winning strategy for the appropriate quantifer to establish the truth or falsity of
$$(\exists x)(\forall y)(\exists z)(x = y + z)$$
in the real numbers.

(a) The appropriate quantifier is: ___$\exists$___.

(b) The strategy is:
   (i) First Play: Quantifier ___$\exists$___ chooses ___$x = 0$___.

   (ii) Second Play: Quantifier ___$\forall$___ chooses ___any y he wants___.

   (iii) Third Play: Quantifier ___$\exists$___ chooses ___$z = -y$___.

(c) This is a winning strategy, since ___$0 = y + (-y)$___.

2. Write $p \leftrightarrow q$ in disjunctive normal form.

p	q	$p \leftrightarrow q$
0	0	1
0	1	0
1	0	0
1	1	1

The truth table for $p \leftrightarrow q$ has two 1's in its final column, so $p \leftrightarrow q$ can be written as a sum of two monomials, namely

$$p \leftrightarrow q \equiv ((\neg p) \wedge (\neg q)) \vee (p \wedge q).$$