

University of Calgary
Department of Mathematics and Statistics

MATH 271 (L60)

Date of exam
July 10, 2007

QUIZ 1

Duration of exam
35 minutes

STUDENT'S NAME OR ID: SOLUTION KEY

INSTRUCTIONS: No calculators, open book or formula sheets.

1. [6 marks] Use a truth table to determine whether the following statement from is a tautology or a contradiction.

$$S = ((\sim p \wedge q) \wedge (q \wedge r)) \wedge \sim q$$

p	q	r	$\sim p$	$\sim q$	$\sim p \wedge q$	$q \wedge r$	$(\sim p \wedge q) \wedge (q \wedge r)$	S
T	T	T	F	F	F	T	F	F
T	T	F	F	F	F	F	F	F
T	F	T	F	T	F	F	F	F
F	T	T	T	F	T	T	T	F
T	F	F	F	T	F	F	F	F
F	T	F	T	F	T	F	F	F
F	F	T	T	T	F	F	F	F
F	F	F	T	T	F	F	F	F

2. [4 marks] Write negations for each of the following statements.
- If n is divisible by 6, then n is divisible by 2 and n is divisible by 3.
 - If the decimal expansion of r is terminating, then r is rational.

CONTRADICTION

marks] a) n is divisible by 6 but n is not divisible by 2 or n is not divisible by 3.

marks] b) The decimal expansion of r is terminating and r is not rational.

3. [4 marks] Rewrite each of the following statements as universal conditionals.

a) No irrational numbers are integers.

b) The number -1 is not equal to the square of any real number.

[2 marks] a) \forall irrational numbers x , x is not an integer.

[2 marks] b) \forall real numbers x , x^2 is not equal to -1 .

4 [6 marks] Write a formal negation of each statement.

a) \forall integers d , if $6/d$ is an integer then $d = 3$.

b) $\forall x \in \mathbb{R}$, if $x(x+1) > 0$ then $x > 0$ or $x < -1$.

c) \exists a band b such that b has won at least 10 Grammy awards.

[2 marks] a) \exists an integer d such that $6/d$ is an integer and $d \neq 3$.

[2 marks] b) \exists a real number x such that $x(x+1) > 0$ and both $x \leq 0$ and $x \geq -1$.

[2 marks] c) \forall all bands b , b has won less than 10 Grammy awards.

MARKS:

1).....

2).....

3).....

4).....

Total:.....