

Name: _____

Perm No.: _____

Section Time :

Math 8 - Midterm

October 19, 2007

Instructions:

- This exam consists of 4 problems for a total of 40 points.
- You must show all your work and fully justify your answers in order to receive full credit. Partial credit will be given for work that is relevant and correct. Your proofs will be graded for clarity and organization, in addition to correctness.
- No books, notes or calculators are allowed.
- Write your answers on the test itself, in the space allotted. You may attach additional pages if necessary.

1	
2	
3	
4	
Total	

1. (12 pts) Consider the proposition R

“If I go surfing or take a nap, then I will not go surfing or I will not take a nap.”

(a) (2 pts) Express this proposition symbolically in terms of propositional variables P and Q and logical connectives. Be sure to say what P and Q represent.

(b) (6 pts) Make a truth table for your answer to (a).

(c) (4 pts) State the converse and contrapositive of R as English sentences (without using phrases like “it is not the case that”, etc.). It may help to first write them in terms of P and Q .

2. (10 pts) Let P be the proposition

“The sum of a rational number and an irrational number is irrational.”

(a) (2 pts) Rephrase P as a conditional statement. (You may want to introduce some variables x, y .)

(b) (2 pts) Express P in terms of symbols and variables only, without using words.

(c) (6 pts) Prove P is true.

3. (a) (4 pts) List (or otherwise describe) the elements of the set $S = \{x \in \mathbb{R} \mid 3x \in \mathbb{N}\}$.

(b) (4 pts) List (or otherwise describe) the elements of the set $T = \{1/x \mid x \in S\}$.

4. (10 pts) Prove that an integer n is the product of two even integers if and only if it is a multiple of 4.