Quiz 4

MATH 100:11 Mathematical Concepts
Instructor: Tara Taylor

November 8, 2011

Name: SOLUTIONS

This quiz is double-sided!

1. Find the negation of the following statement: "If Jasmine graduates this year, then she will get a new car and go to Paris." Note: it might help to convert the statement to symbols first, but be sure your final answer is in words. [2]

$p \rightarrow (q \wedge r)$

Negation of $p \rightarrow q$ is $p \wedge \sim q$

So negation of $p \rightarrow (q \wedge r)$ is $p \wedge \sim(q \wedge r)$

$\equiv p \wedge (\sim q \vee \sim r)$

Jasmine graduates this year and she doesn't get a new car or doesn't go to Paris

2. Consider the statement "If a number is a multiple of four, then it is a multiple of two." [3]

   (a) What is the truth value to this statement?

   (b) What is the inverse to the statement?

   (c) Show that the truth value of the inverse is false by giving a counter-example.

a) true - any multiple of 4 is multiple of 2 since $4 = 2 \times 2$

b) Inverse of $p \rightarrow q$ is $\sim p \rightarrow \sim q$

So IF a number is not a multiple of 4 then it is not a multiple of 2

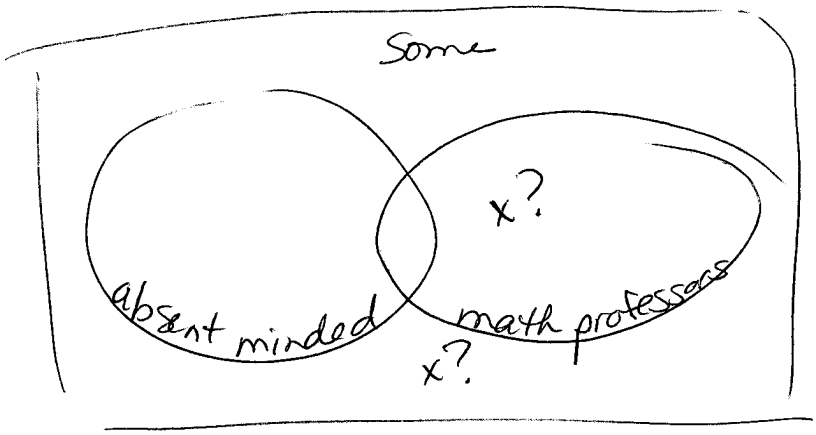
c) ex 6 is not a multiple of 4 but is a multiple of 2 so must be false

3. Construct a truth table to prove that the implication $p \rightarrow q$ is not logically equivalent to its converse $q \rightarrow p$ (explain). [2.5]

p	q	$p \rightarrow q$	$q \rightarrow p$
T	T	T	T
T	F	F	T
F	T	T	F
F	F	T	T

don't have same truth values so not logically equiv.

4. Use an Euler diagram to determine if the following argument is valid or invalid: "Some math professors are absent-minded. Danielle is not absent-minded. Therefore, Danielle is not a math professor." (explain) [2.5]



x - Danielle

x could be outside of math professors but not necessarily, so the argument is invalid