

Math205 Test 2

October 16th, 2007

Answer all questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown and the questions can be answered in any order. Please start a fresh side of paper for each question.

1. (a) Simplify this expression (using reversed relations from handout 1 where necessary) until you get it down to an expression with just 3 letters and two implications. [8]

$$(p \vee r) \wedge (q \rightarrow (q \wedge p))$$

- (b) Verify your answer using a truth table. [3]
2. (a) Solve algebraically when these two propositions are true and hence plot the regions on the number line: $p(x) := " |3x + 8| \leq 5 "$, $q(x) := " 2x^2 + 12 > -11x "$ [4]
- (b) Negate this statement and hence explain why it is false for the $q(x)$ given in part (a): [2]

$$\forall x \in \mathbb{Z} (\sim q(x))$$

- (c) Explain whether or not these two statements are true or false for the expressions in part (a): [3]

$$\forall x \in \mathbb{R} (p(x) \vee q(x)) \quad , \quad \exists x \in \mathbb{N} (p(x) \wedge q(x))$$