

Math 220 Exam 1
September 28, 2018
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Name _____

There are 5 questions, for a total of 100 points. Point values are written beside each question.

1. Consider the statement: For all real numbers x and y , if x and y are irrational, then xy is irrational.

(a) [5 points] Write the converse of this statement.

(b) [5] Write the contrapositive of this statement.

(c) [5] Write the negation of this statement.

(d) [5] Which of the above four statements (*the proposition, its converse (a), its contrapositive (b), its negation (c)*) are true? (You need not justify your answer.)

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2. [15] Prove that for all integers n , $n^2 + 3n$ is even.

3. [30] Prove that for all integers m and n , mn is odd if and only if m is odd and n is odd.

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4. [15] Prove that there do not exist integers m and n for which $6m - 14n = 7$.

5. [20] Prove by induction that for each positive integer n ,
- $$1 + 3 + 5 + \cdots + (2n - 1) = n^2.$$