Math 220 Practice for Exam 1

1. Consider the statement: For all integers m and n, if m is even and n is even, then $m + n$ is divisible by 4.
(a) Write the converse of this statement.

(b) Write the contrapositive of this statement.

(c) 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.)

2. Consider the statement: For all real numbers x and y, if xy is rational, then x is rational.
(a) Write the converse of this statement.

(b) Write the contrapositive of this statement.

(c) Write the negation of this statement.

(d) 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.)

3. Prove that for all integers m and n, if m and n are both odd, then $m + n$ is even. Is the converse true?

4. Prove that for all integers n, n is divisible by 3 if, and only if, n^2 is divisible by 3.

5. Prove there do not exist integers m and n for which $9m + 27n = 2$.

6. (a) [5] State the definition of *limit*, that is $\lim_{x \to a} f(x) = L$ means

(b) [15] Prove $\lim_{x \to 3} (1 - 4x) = -11$ using the definition of limit.