MAT 150, Introduction to Advanced Mathematics Name _____

Homework 1

Score_____

1. In the following sentences, circle the logical connectives and write them in symbolic form:

a) A sequence converges only if it is a Cauchy sequence.

b) A function f is continuous at a whenever $\lim_{x \to a} f(x) = f(a)$.

c) A subset of Euclidean space is compact iff it is closed and bounded.

2. Formulate

a) sufficient and necessary condition for a convex quadrilateral to be a parallelogram

b) necessary but not sufficient condition for a convex quadrilateral to be a parallelogram

c) sufficient but not necessary condition for a convex quadrilateral to be a parallelogram.

3. Prove that for any propositions P and Q, the propositional form $P \wedge (P \iff Q) \wedge \neg Q$ is a contradiction (i.e., identically false).

4. Show on the coordinate plane **all** points (x, y) for which the implication $xy \geq 0 \implies xy < 1$ is true. Explain how to get this picture!

5. For the statement below, formulate its converse, its contrapositive and its inverse. Give the truth value of each statement.

If triangles are congruent, then their areas are equal.