

M192: ASSIGNMENT TWO

Due: Tuesday, September 11, 2007.

Question One

Write the contrapositive of each implication.

- (a) If all roses are red, then all violets are blue.
- (b) H is normal if H is not regular.
- (c) If K is closed and bounded, then K is compact.

Question Two

Show the following.

- (a) The inverse implication is logically equivalent to the converse.
- (b) The inverse implication is the contrapositive of the converse.

Question Three

Construct truth tables to prove *De Morgan's laws*.

- (a) $\neg(P \wedge Q) \Leftrightarrow \neg P \vee \neg Q$
- (b) $\neg(P \vee Q) \Leftrightarrow \neg P \wedge \neg Q$

Question Four

Suppose that p and q are positive real numbers. Prove that if $\sqrt{pq} \neq (p+q)/2$, then $p \neq q$.