Name_____**ID** _____

Activity 2-2 (16 Aug 2018)

Inference rules

4. Use inference rules and standard logical equivalences to show that hypotheses

$P \Rightarrow Q$

$P \Rightarrow \neg Q$

leads to the conclusion $\neg P$.

Steps	Reason

5. Using inference rules to argue that if we assume

$\neg P \Rightarrow Q$

$(P \vee R) \Rightarrow \neg S$

$W \Rightarrow S$, and

$\neg Q$

then we can conclude that W is false.

Steps	Reason

Proofs (hints: try using direct proofs and proofs by contrapositions)

6. Prove the following statement:

If integer *c* divides both integers *a* and *b*, then *c* divides *a* - *b*.

7. Prove the following statement: If x is irrational, then $\sqrt{x}$ is irrational.

8. Assume that *x* is a non-zero rational number. Prove that if *y* is irrational, then *xy* is irrational.

9. Prove that for any positive integer *n*, *n* is an odd number if and only if 5*n* + 6 is odd.
(Hint: To prove statement P <=> Q, you can prove that P => Q and Q => P.)

Write your proofs below