

## Homework 5 - Due Thursday, September 15 by 11:59pm

1. Suppose that  $P$  and  $Q$  are statements. Determine whether the following two statements are logically equivalent. Justify your answer.
  - $\sim (P \rightarrow Q)$
  - $P \rightarrow \sim Q$
2. For each of the following implications, determine its (i) negation and (ii) contrapositive. Be careful with quantification.
  - (a) If a function is continuous, then it is differentiable.
  - (b) If  $|x - 4| < 2$  then  $-2 < x < 2$ .
  - (c) For all integers  $a, b, c$ , if  $a$  divides  $b$  and  $b$  divides  $c$  then  $a$  divides  $c$
  - (d) If  $x$  is a multiple of 4 then  $x$  is not a multiple of 7.