

HOMEWORK 1

DUE 12 SEPTEMBER

- (1) Decide which of the following are mathematical statements. Give reasons.
 - (a) $5 + 7 = 13$.
 - (b) $x + 5 = 0$.
 - (c) All real numbers are positive.
- (2) Write truth tables for the following, where P, Q, R are mathematical statements.
 - (a) $P \Rightarrow (Q \wedge R)$.
 - (b) $(P \vee Q) \Rightarrow R$.
 - (c) $P \wedge \neg P$.
 - (d) $P \vee \neg P$.
- (3) For the following problems, only assume the properties of integers that we stated in class on Friday (September 2nd) and the definition of odd and even integers. I expect the proofs to be written precisely and rigorously.
 - (a) Prove that if a is even, so is $a + 2$.
 - (b) Prove that if a is even, $3a^2 + 4a + 7$ is odd.
 - (c) With our given knowledge, can you prove that any integer is either even or odd? If yes, write a proof. If no, explain why.