

Problem Set 2
Due Wednesday January 30

1. Let m and n be integers. Prove that if m and n are odd, then $m + n$ is even.
2. Let m and n be integers. Prove that if m and n are odd, then mn is odd.
3. Let a , b and c be integers. Prove that if a divides b and a divides c , then a divides $b + c$.
4. Determine whether each statement is true or false. If it is true, then prove it. If it is false, then provide a counterexample.
 - (a) For all positive integers n , n is divisible by 3 is necessary for n to be divisible by 6.
 - (b) For all positive integers n , n is divisible by 3 is sufficient for n to be divisible by 6.
 - (c) For all integers n , if n^2 is a multiple of 4, then n is a multiple of 4.
5. Using the definitions of even and odd, use cases to prove that $n^2 + n + 3$ is odd for every integer n .