

Directions: You may work to solve these problems in groups, but all written work must be your own. Unless the problem indicates otherwise, all problems require some justification; a correct answer without supporting reasoning is not sufficient. See “Guidelines and advice” on the course webpage for more information.

1. Prove that if x is an odd integer, then x^3 is odd.
2. Prove that if x and y are integers and x is even, then xy is even.
3. Prove that if $n \in \mathbb{Z}$, then $5n^2 + 3n + 7$ is odd. Hint: try cases.
4. An integer p is *prime* if $p \geq 2$ and the only positive divisors of p are 1 and p . Prove that if n is a positive integer, $n \geq 2$, and n is not prime, then $2^n - 1$ is not prime.