Name: **Math 4580: HW 3** **9/5/2023**

1 Let n be an odd integer. Use the division algorithm to prove that $n^2 \equiv 1 \pmod{8}$.

2 (Judson 2.28 – modified) Let $n \in \mathbb{N}$. Prove that if $2^n - 1$ is prime, then n must be prime.

[HINT: Prove the contrapositive.]

Primes of the form $2^p - 1$ are called **Mersenne primes**. It is not known whether the number of Mersenne primes is finite or infinite. As of right now, there are 51 known Mersenne primes.