ASSIGNMENT 2, DUE WEDNESDAY 7 FEBRUARY

1. Prove that if a is any integer, then $a^2 + a$ is even.

2. Use contraposition to prove that if a product of integers ab is even, then a is even or b is even.

3. Prove that an integer cannot be both even and odd, by way of contradiction.

4. Let x, y and z be real numbers lying in the open interval $(0, 1)$ with $x < y < z$. Prove that two of the three are within $\frac{1}{2}$ of one another.

5. Recall that an integer p is *prime* if $p \geq 2$ and its only positive integer divisors are 1 and p. Also, two integers a and b are said to be *coprime* if $\gcd(a, b) = 1$.

Now let p be a prime number and a an integer. Prove that a and p are coprime if and only if p does not divide a.