Math 312 - Exercise Sheet 2
31 January, 2020

The due date for the assignment is 10 February.

1. (3 points) Let $a, b \in \mathbb{Z}$ such that $a$ is even and $b$ is odd. Is $\gcd(a, b)$ an even integer? Justify.

2. (4 points) Let $a, b \in \mathbb{Z}$. Show that $\gcd(a^2 + b^2, a + b) = \gcd(2a^2, a + b)$.

3. (5 points) Let $k$ be a positive integer. Use the Euclidean algorithm to show that $3k + 2$ and $5k + 3$ are relatively prime.

4. (4 points) Use the fundamental theorem of arithmetic to find the greatest common divisor and the least common multiple of 343 and 999.

5. (4 points) Use the fact that $10^2 = 100$ and $11^2 = 121$ to show that 101 is a prime number.