MATH 2320 – Discrete Mathematics **Assignment #7**
Winter 2020

1. Explain why $|\mathbb{Z}^2| = \aleph_0$
2. (a) Give an example of an infinite collection of distinct finite sets whose intersection is finite.
   (b) Give an example of an infinite collection of distinct infinite sets whose intersection is finite.
   (c) Give an example of an infinite collection of distinct infinite sets whose intersection is infinite.
3. Find integers q and r with $0 \leqslant r < |b|$ such that $a = qb + r$:
   (a) $a = 139$, $b = 6$
   (b) $a = -8241$, $b = 5$
   (c) $a = -9362$, $b = -17$
   (d) $a = 27133$, $b = -45$
4. Let $a = 8850$ and $b = 975$. Let g be the greatest common divisor of a and b.
   (a) Find g.
   (b) Find integers m and n such that $ma + nb = g$.
   (c) What is the least common multiple of a and b?
5. Let $a = 876$ and $b = 1915$. Let g be the greatest common divisor of a and b.
   (a) Find g.
   (b) Find integers m and n such that $ma + nb = g$.
   (c) What is the least common multiple of a and b?
6. Let $a = 81876$ and $b = 13191$. Let g be the greatest common divisor of a and b.
   (a) Find g.
   (b) Find integers m and n such that $ma + nb = g$.
   (c) What is the least common multiple of a and b?
7. Let a and b be integers that are not both zero. Prove that $\gcd(a, a + b) = \gcd(a, b)$.
8. Find integers x and y such that $154x + 260y = 4$.
9. Show that there is no integer solution to $196x + 245y = 3$.
10. Prove: if $k \in \mathbb{N}$ then $\gcd(3k + 2, 5k + 3) = 1$.