

Homework 3 - Math 381 A - Autumn 2016 - Dr. Matthew Conroy

There are two problems below.

You need to do exactly one of them.

Look at your student id number.

If the right-most digit of your student id number is odd, do problem #1.

If the right-most digit of your student id number is even, do problem #2.

1. Define a graph $G = (V, E)$ as follows.

Let $V = \{1, 2, 3, \dots, 19\}$. Define $E = \{(i, j) : i, j \in V, i \neq j, i^2 + j^2 + ij + 4 \text{ is prime}\}$.

Create and solve (using lpsolve) an IP to find the chromatic number of G , $\chi(G)$.

2. Define a graph $G = (V, E)$ as follows.

Let $V = \{1, 2, 3, \dots, 19\}$. Define $E = \{(i, j) : i, j \in V, i \neq j, i + j \text{ is not prime}\}$.

Create and solve (using lpsolve) an IP to find the chromatic number of G , $\chi(G)$.

Be sure to give a complete explanation of your method of solution.

Explicitly list your objective function and all constraints in your IP.

Include *all* code you write to solve the problem, and *all* software output.

You are welcome to use any programming language(s).

Note: Suppose a and b are positive integers.

We say that a is a *divisor* of b if $b = ak$ for some integer k .

A *prime* is an integer greater than 1 that has no divisors other than 1 and itself.

The sequence of primes begins 2, 3, 5, 7, 11,