**Directions:** Solve the following problems. All written work must be your own. See the course syllabus for detailed rules.

- 1. Determine the minimum integer n such that every 2-coloring of  $\{1, \ldots, n\}$  contains a monochromatic solution to x + 2y = z. (Hint: consider the case that 1 and 2 have the same color and the case that 1 and 2 have distinct colors.)
- 2. [3.1.6] How many odd five-digit integers start with an even digit?
- 3. [3.1.8] Count the functions  $f: \{1, \ldots, 7\} \to \{1, 2, 3, 4\}.$
- 4. [3.1.14] How many ways are there to color the vertices of a pentagon with three colors such that no two adjacent vertices receive the same color?