MAU11602 Assignment 9, Due Wednesday 10 April 2024

1. Find all the monoid homomorphisms from $(N, +)$, i.e. the monoid whose set is natural numbers and whose operation is addition, to itself.
   Hint: Describe them in terms of what value the function takes at 1.

2. Consider the language of even integers. As with the integers we'll normalise things so that each even integer has a unique representation by getting rid of leading zeroes, double minus signs, etc. This is a regular language so it can be described in the following ways:

   (a) a regular expression

   (b) a strongly deterministic finite state automaton

   (c) a regular grammar

   Give an example of each.
   Hint: This is the kind of problem where a bit of extra time thinking about different ways to solve the problem can end up saving you some time.