Assignment 1 – Challenge problems

Challenge problem 1 – MultiplierKarel

Write a program which uses Karel to multiply. The starting position has two piles of beepers next to each other. The goal is to produce a pile of beepers whose size is the product of the original two piles. The specifications are as follows:

- Karel begins in the lower-left corner, facing east. There are two piles of beepers, one in the lower-left corner (the same as Karel's starting position), and one on the space immediately to the east, directly in front of Karel. The provided world `Calculator.w` is an example of such a world.
- The objective is to produce a pile of beepers on any square other than the initial two which contains a number of beepers equal to the product of the sizes of the initial two piles.
- At termination, the sizes of the initial two piles should be the same as at the start. It is okay for Karel to change the sizes of these piles while the program runs, but Karel must restore these piles to their original sizes before the program terminates.
- Also at termination, there should be no beepers present in the world other than those in the three piles: the two initial piles, and a third pile representing the product.
- You may assume that the size of the world is at least 3×3, and that there are no beepers initially present in the world other than the ones in the two starting piles.

Challenge Problem 2 – ExplorerKarel

Write a program to fully explore a world. Starting anywhere in a world of unknown shape, Karel should place a beeper at every space in the world. The specifications are as follows:

- The world may be any shape or size, and Karel may start at any position. There may be walls in any location.
- At termination, there should be a beeper at every location which is accessible from Karel's starting point.
- You may assume that the world does not initially contain any beepers.
- You can try using the provided world `Maze.w` to test your program.