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EIP 01

Reading #3A
July 25, 2024

Solutions to Class Exercises

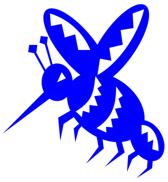
```
/*
 * File: PutBeeperLine.k
 * ---------------------
 * This program implements and tests the PutBeeperLine function.
 */

/*
 * Implements the simple test function used in class.
 */

function test() {
   putBeeperLine();
   turnLeft();
   putBeeperLine();
}

/*
 * Puts down a line of beepers up to and including the wall.
 */

function putBeeperLine() {
   while (frontIsClear()) {
      putBeeper();
      move();
   }
   putBeeper();
}
```

```
/*
 * File: MountainKarel1.k
 * ----------------------
 * This program instructs Karel to climb a simple mountain, plant a
 * flag, and descend to the ground.  This version works only for the
 * specific world shown in the handout.
 */

import "turns";

/*
 * Climbs the specific mountain shown in the handout.
 */

function climbMountain() {
   moveToWall();
   turnLeft();
   move();
   turnRight();
   move();
   turnLeft();
   move();
   turnRight();
   move();
   turnLeft();
   move();
   turnRight();
   move();
   putBeeper();
   move();
   turnRight();
   move();
   turnLeft();
   move();
   turnRight();
   move();
   turnLeft();
   move();
   turnRight();
   move();
   turnLeft();
   moveToWall();
}

/*
 * Moves Karel forward until it is blocked by a wall.
 */

function moveToWall() {
   while (frontIsClear()) {
      move();
   }
}
```

```
/*
 * File: MountainKarel2.k
 * ----------------------
 * This program is the same as MountainKarel1 but defines the functions
 * stepUp and stepDown to simplify the code.
 */

import "turns";

/*
 * Climbs the specific mountain shown in the handout.
 */

function climbMountain() {
   moveToWall();
   stepUp();
   stepUp();
   stepUp();
   putBeeper();
   stepDown();
   stepDown();
   stepDown();
   moveToWall();
}

/*
 * Sends Karel up the step ahead of it.
 */

function stepUp() {
   turnLeft();
   move();
   turnRight();
   move();
}

/*
 * Send Karel down the step ahead of it.
 */

function stepDown() {
   move();
   turnRight();
   move();
   turnLeft();
}

/* The moveToWall function is the same as in the earlier programs */
```

```
/*
 * File: MountainKarel3.k
 * ----------------------
 * This program again solves only the mountain world from the handout,
 * but does so using the repeat statement in a way that makes it easy
 * to adapt the program to climb a stair-step mountain of any size.
 */

import "turns";

/*
 * Climbs a stair-step mountain whose size appears in the repeat statements.
 */

function climbMountain() {
   moveToWall();
   repeat (3) {
      stepUp();
   }
   putBeeper();
   repeat (3) {
      stepDown();
   }
   moveToWall();
}

/*
 * Sends Karel up the step ahead of it.
 */

function stepUp() {
   turnLeft();
   move();
   turnRight();
   move();
}

/*
 * Send Karel down the step ahead of it.
 */

function stepDown() {
   move();
   turnRight();
   move();
   turnLeft();
}

/* The moveToWall function is the same as in the earlier programs */
```

```
/*
 * File: MountainKarel4.k
 * ----------------------
 * This version of the program attempts to generalize the solution
 * strategy so that it climbs a stair-step mountain of any size, but
 * it fails if the end of the world appears immediately after the
 * base of the mountain.
 */

import "turns";

/*
 * Tries to climb a stair-step mountain of any size.
 */

function climbMountain() {
   moveToWall();
   while (frontIsBlocked()) {
      stepUp();
   }
   putBeeper();
   move();
   while (rightIsClear()) {
      dropDown();
   }
   moveToWall();
}

/*
 * Sends Karel up the step ahead of it.
 */

function stepUp() {
   turnLeft();
   move();
   turnRight();
   move();
}

/*
 * Drops down from the midair position just past a descending step.
 */

function dropDown() {
   turnRight();
   move();
   turnLeft();
   move();
}

/* The moveToWall function is the same as in the earlier programs */
```



```
/*
 * File: MountainKarel5.k
 * ----------------------
 * This version fixes the bug in MountainKarel4.k so that it
 * checks for a wall before moving forward in dropDown.
 */

import "turns";

/*
 * Climbs a stair-step mountain of any size.
 */

function climbMountain() {
   moveToWall();
   while (frontIsBlocked()) {
      stepUp();
   }
   putBeeper();
   move();
   while (rightIsClear()) {
      dropDown();
   }
   moveToWall();
}

/*
 * Sends Karel up the step ahead of it.
 */

function stepUp() {
   turnLeft();
   move();
   turnRight();
   move();
}

/*
 * Drops down from the midair position just past a descending step.
 */

function dropDown() {
   turnRight();
   move();
   turnLeft();
   if (frontIsClear()) {
      move();
   }
}

/* The moveToWall function is the same as in the earlier programs */
```