

## UDLR Assignment due Friday May 28, 2021 by midnight

Write a program that accepts a set of instructions to navigate from a starting point to another location on the x, y coordinate plane and then asks for an integer x coordinate then a y coordinate. The instructions are in the form of the letters L for left, R for right, U for up and D for down (any case). The path must be at least four characters long and must be only any combination of the letters U, D, L, and R (any case). Verify that the instructions are all legal and report an error if they are not. If they are legal then execute the path and report if you made it to the origin ( 0, 0 ) or not. If not, report the final distance from the origin using the distance formula.

### Requirements:

- To be valid a path must contain only the letters L, R, U, D (any case) and must be at least four letters long. If the path is not valid, report the first error you find and do not go any further (for example, that the path is too short or that it contains illegal characters.)
- Process the path, printing the location after each path move along with what the move was. If the character is "U", change y by +1, if "D" subtract 1 from y, if "L" subtract 1 from x and so on.
- State if the user made it from the starting point to the origin ( 0, 0 ).
- If not, report the distance to the origin using the distance formula.

The distance formula is simple since one of the points is the origin:  $D = \sqrt{x^2 + y^2}$   
Use Math.sqrt() to find the square root.

See sample runs for how it ought to look. Turn in a repl when you have it running. Don't forget to add "import java.util.Scanner" up top or your Scanner won't work.

### Sample Run 1:

```
Welcome to the Cartesian Plane!
Enter a path containing only the letters UDLR (4
or more characters):
ULULULUL
Enter a starting x location:
4
Enter a starting y location:
-4

Path Verification:
( 4, -4 ) (Start)
( 4, -3 ) (U)
( 3, -3 ) (L)
( 3, -2 ) (U)
( 2, -2 ) (L)
( 2, -1 ) (U)
( 1, -1 ) (L)
( 1, 0 ) (U)
( 0, 0 ) (L)
You made it back to ( 0, 0 ).
```

### Sample Run 2:

```
Welcome to the Cartesian Plane!
Enter a path containing only the letters UDLR (4
or more characters):
UDABC
Enter a starting x location:
4
Enter a starting y location:
4

Illegal character in path at index 2 (A)
```

### Sample Run 3:

```
Welcome to the Cartesian Plane!
Enter a path containing only the letters UDLR (4
or more characters):
UUURR
Enter a starting x location:
3
Enter a starting y location:
2

Path Verification:
( 3, 2 ) (Start)
( 3, 3 ) (U)
( 3, 4 ) (U)
( 3, 5 ) (U)
( 4, 5 ) (R)
( 5, 5 ) (R)
You ended up at ( 5, 5 )
Distance from the origin: 7.0710678118654755
```

### Sample Run 4:

```
Welcome to the Cartesian Plane!
Enter a path containing only the letters UDLR (4
or more characters):
UDL
Enter a starting x location:
2
Enter a starting y location:
3

Path is too short (must be at least 4 characters
long).
```