

1 Usage

1.1 Input

Upon calling **makepoints**, print a number 0 or 1 to **cin**. 0 is for generating a slope field, 1 is for generating a curve.

To generate a slope field, enter the following arguments in this order:

```
string rp #a string containing a postfix
expression, according to the definition below
#the next four variables define a section of
the Cartesian Plane to hold the slope field
double xmin
double xmax
double ymin
double ymax
int xs #the number of columns in the slope field
int ys #the number of rows in the slope field
```

And to generate a curve:

```
string rp
double xmin
double xmax
double ymin
double ymax
double initx #the x-coordinate of the initial condition
double inity #the y-coordinate of the initial condition
double samples #the number of line segments making up the curve
double len #the length of the desired curve
```

1.2 Output

All input is printed to **cout**.

If a slope field was generated, then the output will be a list of numbers, corresponding to slopes. They are ordered as follows: First is the slope corresponding to the bottom-leftmost point in the slope field. From there they increase in y but not in x , **ys** times. Then it returns to the bottom and increments x by 1, and so on, going up each column in turn. Each slope is separated by a new line. Keep in mind that $\pm\mathbf{nan}$ and $\pm\mathbf{inf}$ are possible outputs and must be dealt with.

If a curve was generated, then the output will be a list of pairs of numbers. Within pairs, numbers are separated by spaces, and pairs are separated by new lines. The first element of a pair corresponds to its relative x -position in the specified range; -1 is the furthest left x value, and 1 is the furthest right. Similarly, the second corresponds to its relative y -position, again from -1 to 1. *Keep in mind that $|x|$ or $|y|$ can be greater than 1; this indicates that it is*

outside of the specified range. The pairs are all sorted from smallest to greatest value of x . The curve is generated by “connecting the dots” in order that they are outputted. Termination of the output is marked by the pair **inf inf**.

2 Postfix String

2.1 Functions

2.1.1 Nice Functions

$$x\ y\ + = x + y \quad x\ y\ - = x - y \quad x\ y\ * = x \times y$$

$$x\ y\ /\ = \frac{x}{y} \quad x\ y\ \wedge = x^y$$

$$x\ l = \ln(x) \quad x\ a = |x|$$

2.1.2 Trig Functions

$$x\ s = \sin(x) \quad x\ c = \cos(x) \quad x\ t = \tan(x)$$

$$x\ u = \arcsin(x) \quad x\ v = \arccos(x) \quad x\ w = \arctan(x)$$

$$x\ p = \sec(x) \quad x\ q = \csc(x) \quad x\ r = \cot(x)$$

$$x\ d = \operatorname{arcsec}(x) \quad x\ e = \operatorname{arccsc}(x) \quad x\ f = \operatorname{arccot}(x)$$

$$x\ h = \sinh(x) \quad x\ i = \cosh(x) \quad x\ j = \tanh(x)$$

$$x\ m = \operatorname{arcsech}(x) \quad x\ n = \operatorname{arccoth}(x) \quad x\ o = \operatorname{arccsch}(x)$$

$$x\ g = \operatorname{sech}(x) \quad x\ k = \operatorname{csch}(x) \quad x\ z = \operatorname{coth}(x)$$

$$x\ A = \operatorname{arcsec}(x) \quad x\ B = \operatorname{arccsc}(x) \quad x\ C = \operatorname{arccot}(x)$$

2.2 Requirements

- The RPN expression must have every argument separated by one space.
- The RPN expression must have a trailing space.