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 rpn #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 rpn
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 $\pm$**nan** and $\pm$**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. The pairs are all sorted from smallest to greatest value of x. The curve is

generated by "connecting the dots" in order of increasing x. Termination of the output is marked by the pair **inf inf**.

2 Postfix String

2.1 Functions

2.1.1 Nice Functions

$x\ y\ + = x + y$	$x\ y\ - = x - y$	$x\ y\ * = x \times y$
$x\ y\ / = \frac{x}{y}$	$x\ y\ \hat{} = x^y$	
x l $= \ln(x)$	x a $= \lvert x \rvert$	

2.1.2 Trig Functions

x s $= \sin(x)$	x c $= \cos(x)$	x t $= \tan(x)$
x u $= \arcsin(x)$	x v $= \arccos(x)$	x w $= \arctan(x)$
x p $= \sec(x)$	x q $= \csc(x)$	x r $= \cot(x)$
x d $= \operatorname{arcsec}(x)$	x e $= \operatorname{arccsc}(x)$	x f $= \operatorname{arccot}(x)$
x h $= \sinh(x)$	x i $= \cosh(x)$	x j $= \tanh(x)$
x m $= \operatorname{arcsech}(x)$	x n $= \operatorname{arccoth}(x)$	x o $= \operatorname{arccsch}(x)$
x g $= \operatorname{sech}(x)$	x k $= \operatorname{csch}(x)$	x z $= \coth(x)$
x A $= \operatorname{arcsec}(x)$	x B $= \operatorname{arccsc}(x)$	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.