Polygon generator

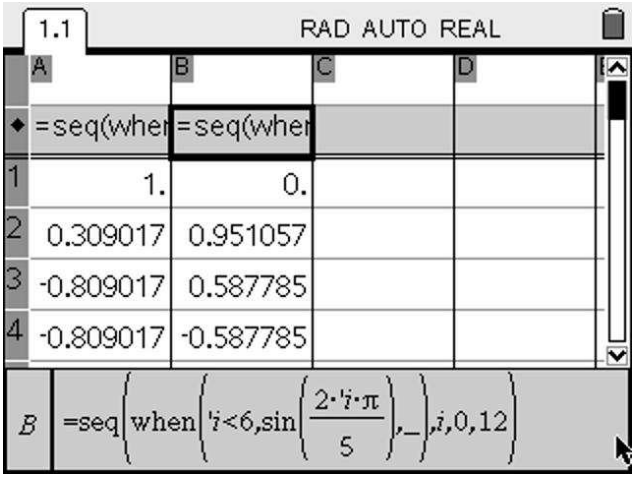
The goal is to build a set of regular polygons using appropriate scatter plots. But instead of building a set of equal polygons, we're going to build the full collection: a triangle, square, pentagon, etc. On total there will be 10 polygons, starting with the triangle and ending up with a dodecagon.

This construction has one added problem: one cannot nest two **seq** commands unless the inner command generates lists of the same size.

First build a n sided polygon (choose n at will). Generate it with the **seq** command but add extra void elements, until the list reaches 13 elements (the number of points needed for the dodecagon.

You can achieve this with an extra **when** statement, to add void elements when i is bigger than some number.

On this example, from i=6 only void elements are generated.

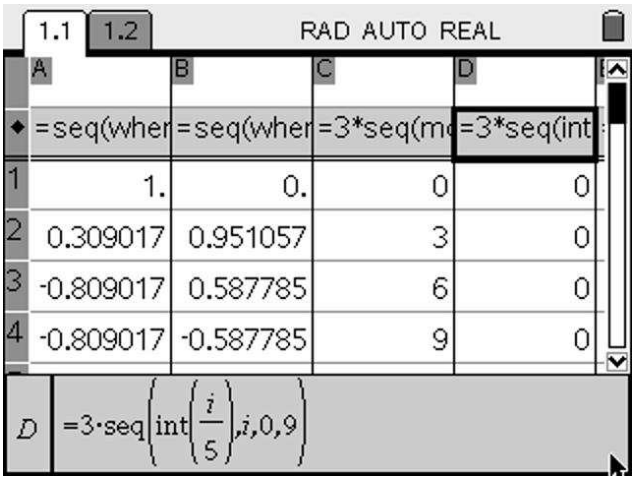


Next generate the grid over which the polygons shall be drawn. Being a set of 10 polygons the best way is to lay them in two rows.

So, using **int** and **mod**, create the grid.

Remember that to generate a grid of 10 points you need to start with i=0 and go until i=9.

Also have the grid have a spacing of 3, as each polygon will have a radius of 1.



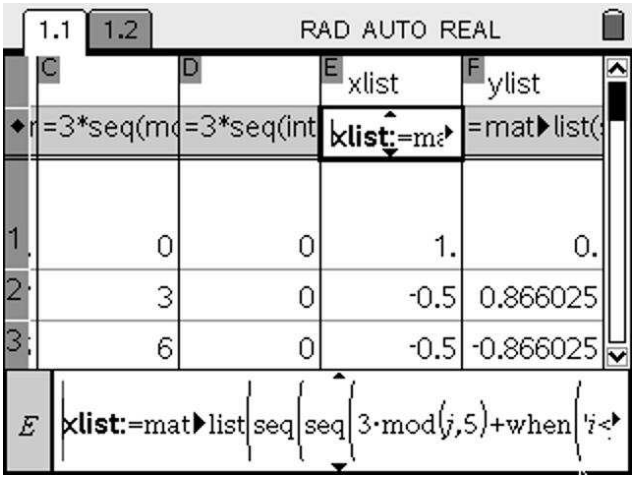
Now, use two nested **seq** commands, the outer one giving the grid's coordinates and the inner one providing the polygon's vertices, filled up with void elements.

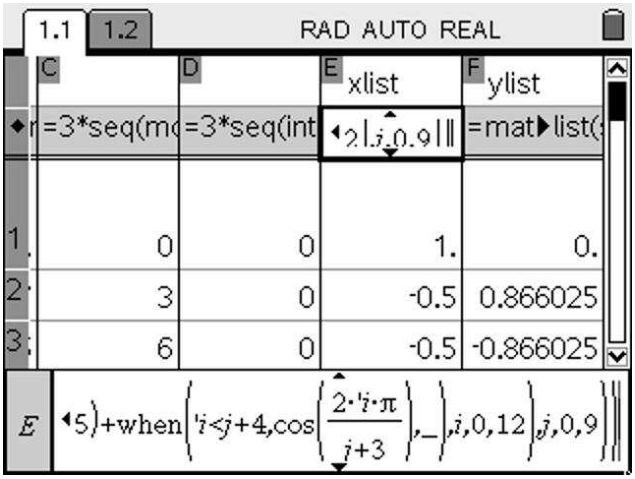
To achieve this, use **j** as the variable of the outer **seq** command and **i** as the variable of the inner **seq** command.

The formulas are quite complex, so here they are:
mat▸list(seq(seq(3*mod(j,5)+ when('i<j+4,cos(((2*'i*π)/ (j+3))),_),i,0,12),j,0,9))

mat▸list(seq(seq(3*int(j/5)+ when('i<j+4,sin(((2*'i*π)/ (j+3))),_),i,0,12),j,0,9))

This formulas mean the following:
- the inner **seq** command generates a polygon with **j+3** points (so, a triangle when j=0, a square when j=1, etc.);
- the rest of the list is filled up with void elements, due to the when statement;
- the outer **seq** command adds the grid's coordinates.
- as two nested **seq** commands generate a matrix, the result is converted back to a list.





Back to the G&G page define a scatter plot using xlist and ylist and adjust the window in a suitable way.

Change the plot's attributes to make it look nicer and hide the axis.

You have built a set of regular polygons, from the triangle to the dodecagon.