

# Some Extra Notes on Lab 2: Spirographs

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## 1 Maple

When Maple plots a parametric curve, you give it a time interval for both  $x(t)$  and  $y(t)$ . Maple will divide up the time interval and will take 50 points. This does not change whether time runs from 0 to 1 or from 0 to 1000 (this is not entirely accurate, but its close). To force Maple to use more time values, insert `numpoints=` the number of points you want to use. For example,

```
plot( [x,y,t=0..200],numpoints=1000);
```

You can also use this plotting option in a normal plot:

```
plot(sin(x),x=-3..7,numpoints=1000,style=point);
```

When obtaining a spirograph plot, be sure you're seeing an accurate depiction.

## 2 Other Notes

1. Since the diagram you used to obtain the equations for  $x(t)$  and  $y(t)$  are a little complex, for this lab you may attach a handwritten figure (So in the latex code, you won't be able to do a `\ref`). For the rest of the equations and figures, label them where appropriate and refer to them using Latex. Remember- I want you to lead me through a discussion of how you constructed your equations.
2. Values of  $R, r, h$ : Are negative numbers valid for any of them?
3. For "When is the spirograph a closed curve", you might consider this:  
If the spirograph is a closed curve, then the initial position of the pen (and the small circle) will return at some value of time. Therefore, we might argue that the circumferences of the two circles have to be...?
4. When you write your results up, try to incorporate all the questions (and your answers) into a cohesive discussion- Try to put it into a story with a beginning, a middle, and an end.