Maple Project I

Polar Plots

To plot in maple the **parametric equations**

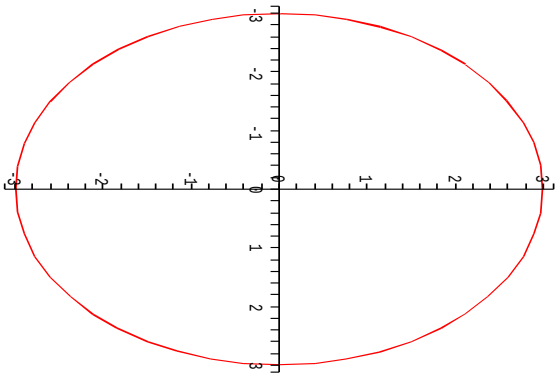
$$x = f(t), \qquad y = g(t), \qquad \text{with} \qquad t \in [a, b]$$

We type the command:

plot([f(t), g(t), t=a..b]);

For example, to plot a circle of radius 3 centered at the origin, we type

```
> plot([3*cos(t), 3*sin(t), t=0..2*Pi], scaling=constrained);
```



To plot the polar equation

$$r = r(t), \qquad t \in [\alpha, \beta]$$

where α and β are certain angles, we need to convert the given equation from **polar coordinates** to **rectangular coordinates** using the equations:

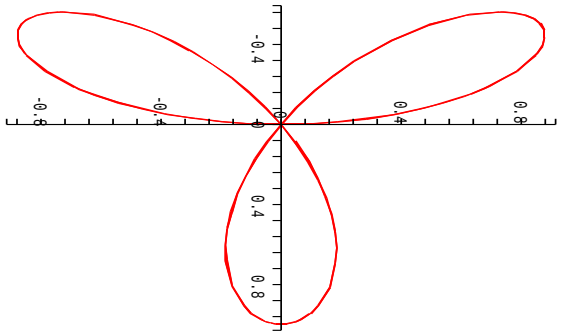
$$x = r\cos(t), \qquad y = r\sin(t)$$

Example: Plot the polar equation

$$r = \cos(3t), \qquad \text{with} \qquad t \in [0, 2\pi]$$

In maple format:

```
> r:=cos(3*t):  plot([r*cos(t), r*sin(t), t=0..2*Pi], scaling=constrained);
```



Homework:

1. Using constrained scaling, plot the ellipse $x = 3\cos(t)$ and $y = \sin(t)$
2. Graph each of the following equations. If the graph is a conic section (ellipse, hyperbola, or parabola), then give the location of the foci or focus.
   (a) $r = \sin(2t)$
   (b) $r = 2\cos(t) + 1$
   (c) $r^2 = \cos(2t)$
3. Find graphically the intersection points of the parabolas

$$r = \frac{1}{1 - \cos(t)} \qquad \text{and} \qquad r = \frac{3}{1 + \cos(t)}$$

Hint: To get a better display of the graphs restrict your plot to the window $[-5, 5] \times [-5, 5]$