Example 3: Plot the curve that is represented parametrically by the equations

Written by Prof. Kevin G. TeBeest
Dept. of Mathematics
Kettering University
07/11/2012

$$x = 2 + \cos(t) \quad \text{and} \quad y = 4 + 2\cdot\sin(t)$$

on the interval $-\pi \le t \le \pi$.

```
> restart ;
> with(plots) :
> f := t -> 2 + cos(t) ;
```

$$f := t \to 2 + \cos(t) \tag{1}$$

```
> g := t -> 4 + 2*sin(t) ;
```

$$g := t \to 4 + 2\sin(t) \tag{2}$$

```
> a := -Pi ;
```

$$a := -\pi \tag{3}$$

```
> b := Pi ;
```

$$b := \pi \tag{4}$$

```
> Subints := 20 ;
```

$$Subints := 20 \tag{5}$$

```
> h := (b-a)/Subints ;
```

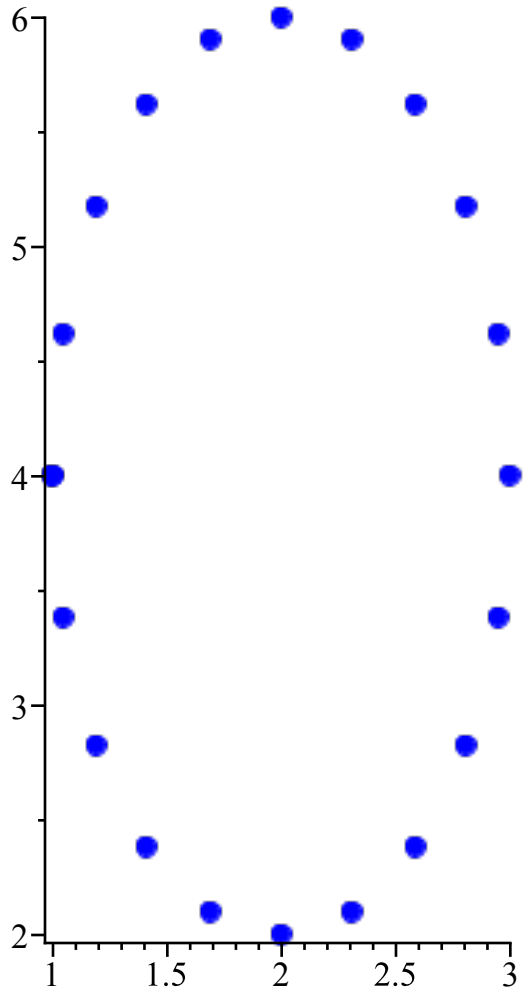
$$h := \frac{1}{10}\,\pi \tag{6}$$

```
> printf("\n    i     t           x           y\n  ----------------
  --------------------\n"):
  for i from 0 to Subints do
      T[i] := a + h*i:
      X[i] := f(T[i]):
      Y[i] := g(T[i]):
      printf("  %3d  %8.5f  %10.7f  %10.7f\n", i, T[i], X[i], Y[i])
  :
  od:
```

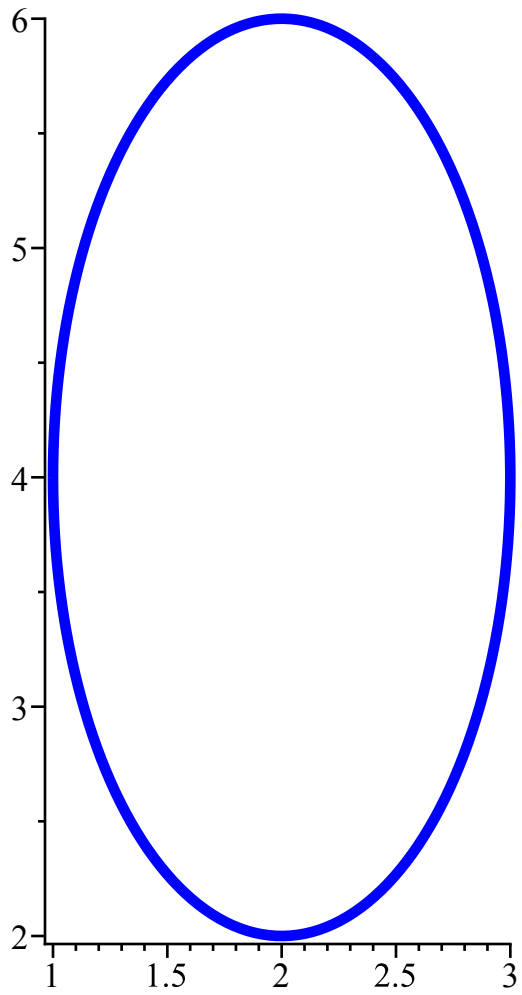
```
   i     t           x           y
  -------------------------------------
   0  -3.14159   1.0000000   4.0000000
   1  -2.82743   1.0489435   3.3819660
   2  -2.51327   1.1909830   2.8244295
   3  -2.19911   1.4122147   2.3819660
   4  -1.88496   1.6909830   2.0978870
   5  -1.57080   2.0000000   2.0000000
   6  -1.25664   2.3090170   2.0978870
```

7	-0.94248	2.5877853	2.3819660
8	-0.62832	2.8090170	2.8244295
9	-0.31416	2.9510565	3.3819660
10	0.00000	3.0000000	4.0000000
11	0.31416	2.9510565	4.6180340
12	0.62832	2.8090170	5.1755705
13	0.94248	2.5877853	5.6180340
14	1.25664	2.3090170	5.9021130
15	1.57080	2.0000000	6.0000000
16	1.88496	1.6909830	5.9021130
17	2.19911	1.4122147	5.6180340
18	2.51327	1.1909830	5.1755705
19	2.82743	1.0489435	4.6180340
20	3.14159	1.0000000	4.0000000

```
> plot( [[ f(T[k]), g(T[k]) ]$k = 0 .. Subints ], style=point,
  symbol=solidcircle, symbolsize=16, color=blue, scaling=
  constrained, view=[1..3,2..6] ) ;
```




```
> plot( [ f(t), g(t), t = a .. b ], color = blue, thickness = 4,
  scaling=constrained, view=[1..3,2..6] );
```



Create the animation to see the curve's growth and its direction:

```
> animatecurve([ f(t),g(t), t = a .. b], frames=50, color=blue,
  thickness=4, numpoints=200, scaling = constrained, view=[1..3,2.
  .6] );
```