

Example 5: Plot the curve that is represented parametrically by the equations

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$$x = 3 + \sin(t) \quad \text{and} \quad y = 1 - \cos(t)$$

on the interval $0 \leq t \leq \pi$.

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

$$f := t \rightarrow 2 + \sin(t) \quad (1)$$

```
> g := t -> 1 - cos(t) ;
```

$$g := t \rightarrow 1 - \cos(t) \quad (2)$$

```
> a := 0 ;
```

$$a := 0 \quad (3)$$

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

$$b := \pi \quad (4)$$

```
> Subints := 30 ;
```

$$\text{Subints} := 30 \quad (5)$$

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

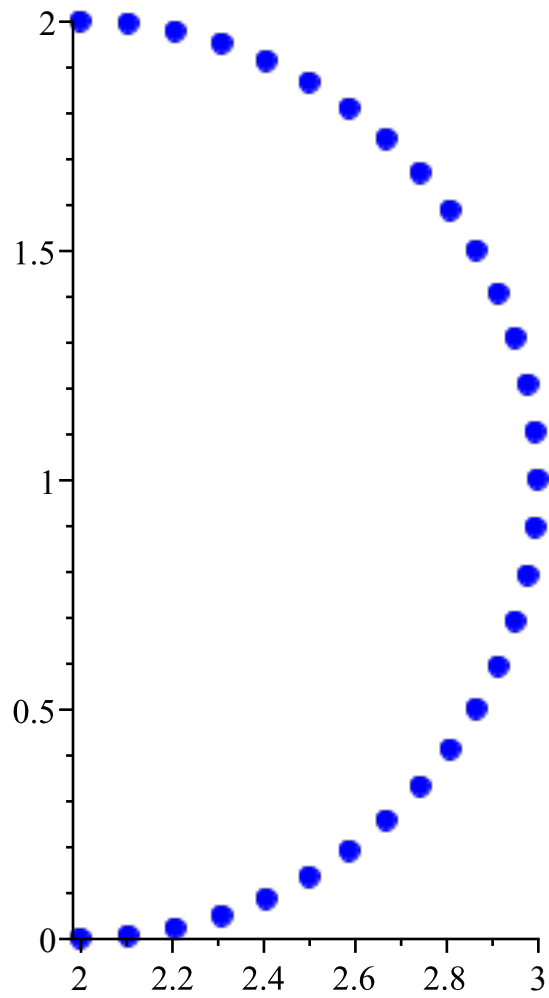
$$h := \frac{1}{30} \pi \quad (6)$$

```
> printf("\n      i          t          x          y\n -----\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   %10.5f   %12.7f   %12.7f\n", i, T[i], X[i], Y[i])
):
od:
```

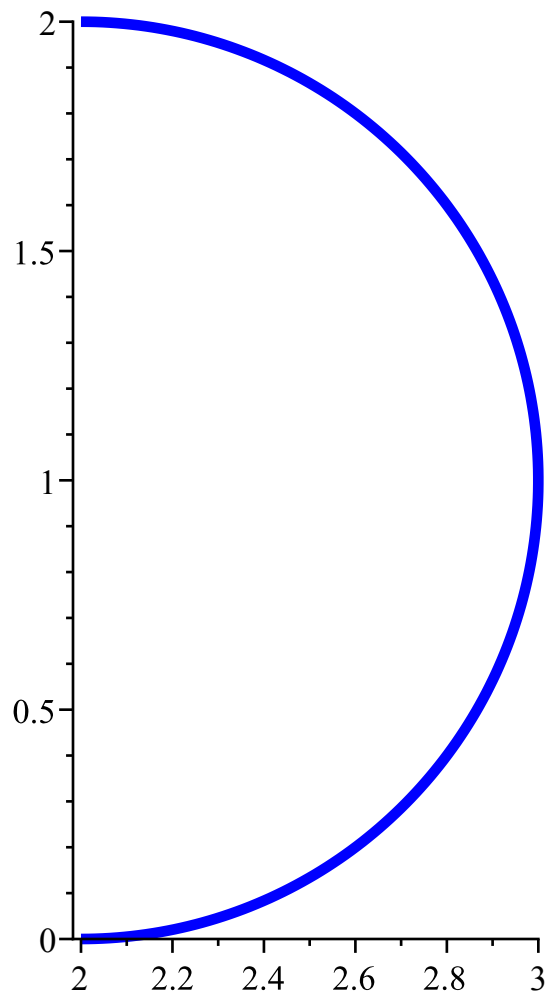
i	t	x	y
0	0.00000	2.0000000	0.0000000
1	0.10472	2.1045285	0.0054781
2	0.20944	2.2079117	0.0218524
3	0.31416	2.3090170	0.0489435
4	0.41888	2.4067366	0.0864545
5	0.52360	2.5000000	0.1339746
6	0.62832	2.5877853	0.1909830
7	0.73304	2.6691306	0.2568552

8	0.83776	2.7431448	0.3308694
9	0.94248	2.8090170	0.4122147
10	1.04720	2.8660254	0.5000000
11	1.15192	2.9135455	0.5932634
12	1.25664	2.9510565	0.6909830
13	1.36136	2.9781476	0.7920883
14	1.46608	2.9945219	0.8954715
15	1.57080	3.0000000	1.0000000
16	1.67552	2.9945219	1.1045285
17	1.78024	2.9781476	1.2079117
18	1.88496	2.9510565	1.3090170
19	1.98968	2.9135455	1.4067366
20	2.09440	2.8660254	1.5000000
21	2.19911	2.8090170	1.5877853
22	2.30383	2.7431448	1.6691306
23	2.40855	2.6691306	1.7431448
24	2.51327	2.5877853	1.8090170
25	2.61799	2.5000000	1.8660254
26	2.72271	2.4067366	1.9135455
27	2.82743	2.3090170	1.9510565
28	2.93215	2.2079117	1.9781476
29	3.03687	2.1045285	1.9945219
30	3.14159	2.0000000	2.0000000

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



```
> plot( [ f(t), g(t), t = a .. b ], color = blue, thickness = 4,  
scaling = constrained, view = [2..3,0..2] );
```



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 = [2..3,  
  0..2] );
```