Plotting the Sine function $\sin(t)$

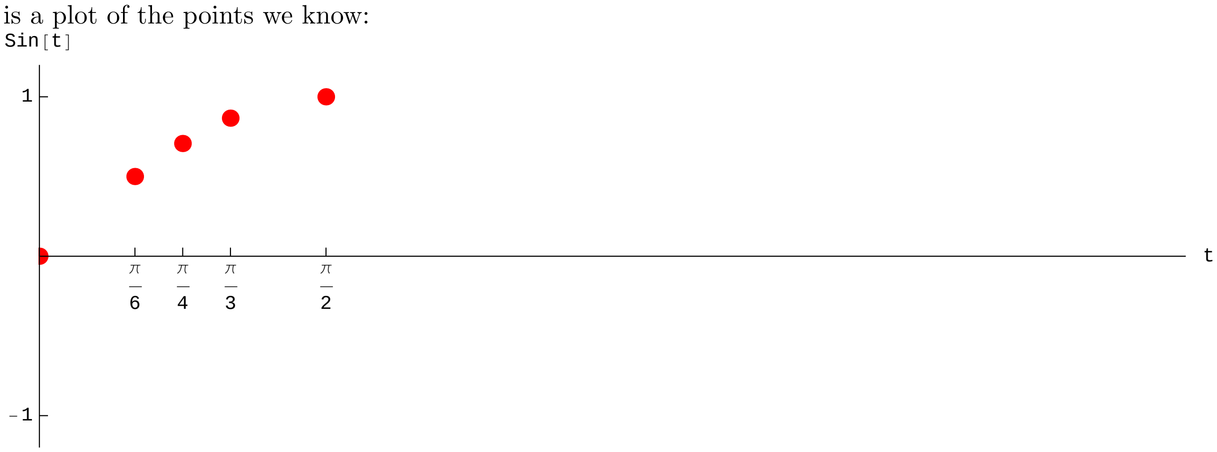
Quadrant I

Here are the values in the first quandrant (including the quadrantal angles) for which we know the value of $\sin(t)$ exactly. These are found using the two special traingles, constructed from a square and an equilateral triangle.

t_i	$\text{Sin}[t_i]$
0	0
$\frac{\pi}{6}$	$\frac{1}{2}$
$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{2}$	1

Here is a plot of the points we know:

Out[8]=



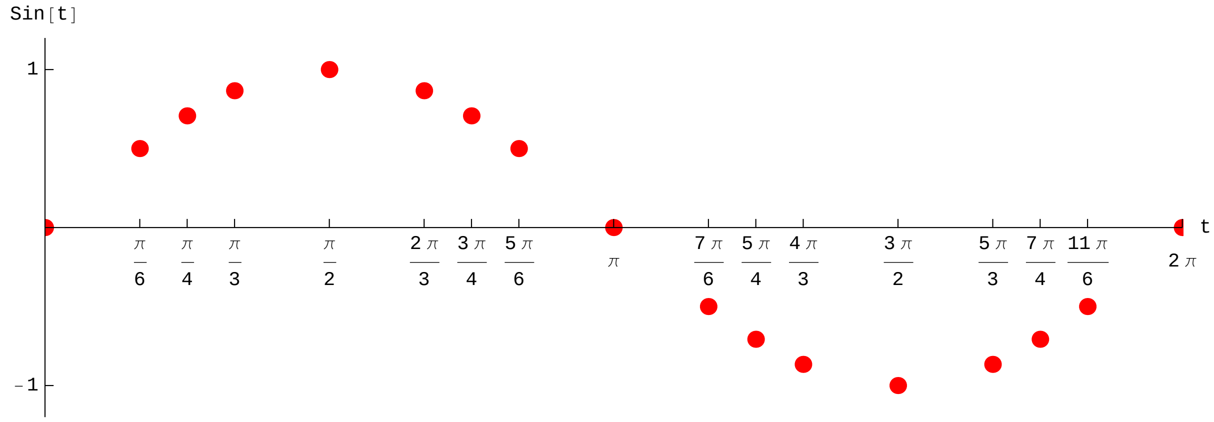
Extending to Quadrants II, III, and IV

We can continue this around the unit circle, to get the following known values of $\sin(t)$.

t_i	$\text{Sin}[t_i]$
0	0
$\frac{\pi}{6}$	$\frac{1}{2}$
$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{2}$	1
$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2}$
$\frac{3\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{5\pi}{6}$	$\frac{1}{2}$
π	0
$\frac{7\pi}{6}$	$-\frac{1}{2}$
$\frac{5\pi}{4}$	$-\frac{1}{\sqrt{2}}$
$\frac{4\pi}{3}$	$-\frac{\sqrt{3}}{2}$
$\frac{3\pi}{2}$	-1
$\frac{5\pi}{3}$	$-\frac{\sqrt{3}}{2}$
$\frac{7\pi}{4}$	$-\frac{1}{\sqrt{2}}$
$\frac{11\pi}{6}$	$-\frac{1}{2}$
2π	0

Here is a plot of the points we know:

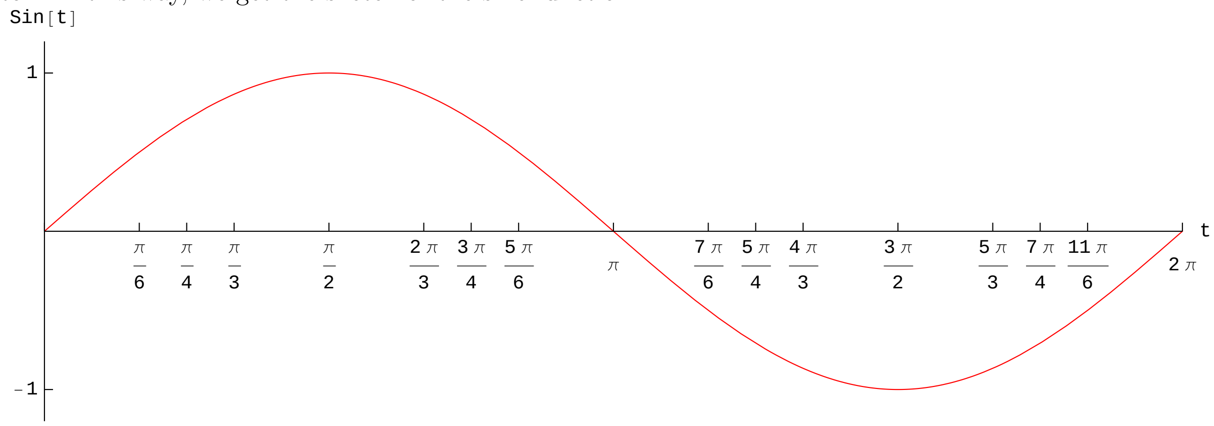
Out[12]=



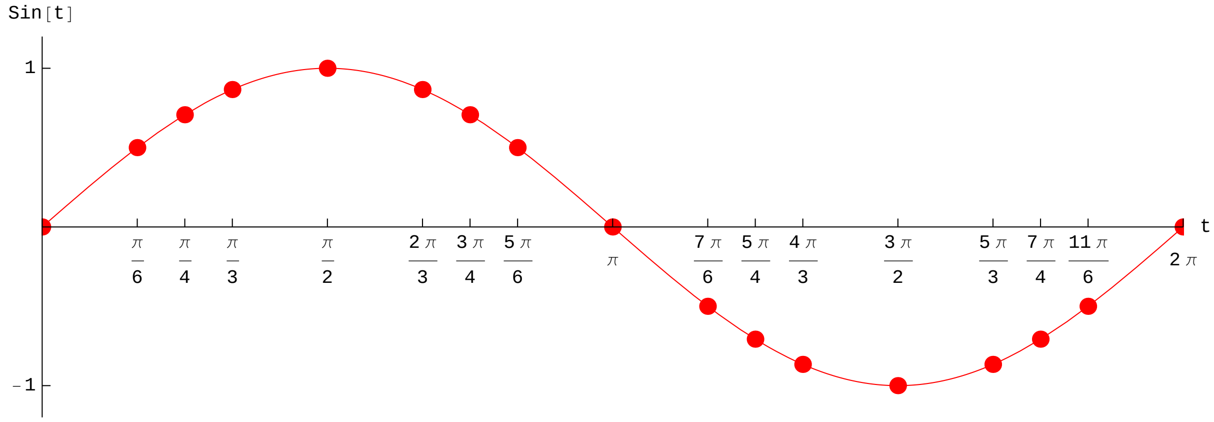
The Value of $\sin(t)$ at Other Angles

This gets us back to the point $t = 0$. To evaluate the value of $\sin(t)$ at points other than these special points, we can use a calculator. In this way, we get the sketch of the sine function

Out[13]=



Out[14]=



The function $\sin(t)$ will be periodic since the angles $t > 2\pi$will sweep out the same curve at t increases.

Plotting the Cosine function $\cos(t)$

Quadrant I

Here are the values in the first quandrant (including the quadrantal angles) for which we know the value of $\cos(t)$ exactly. These are found using the two special traingles, constructed from a square and an equilateral triangle.

t_i	$\text{Cos}[t_i]$
0	1
$\frac{\pi}{6}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{\pi}{3}$	$\frac{1}{2}$
$\frac{\pi}{2}$	0

Here is a plot of the points we know:

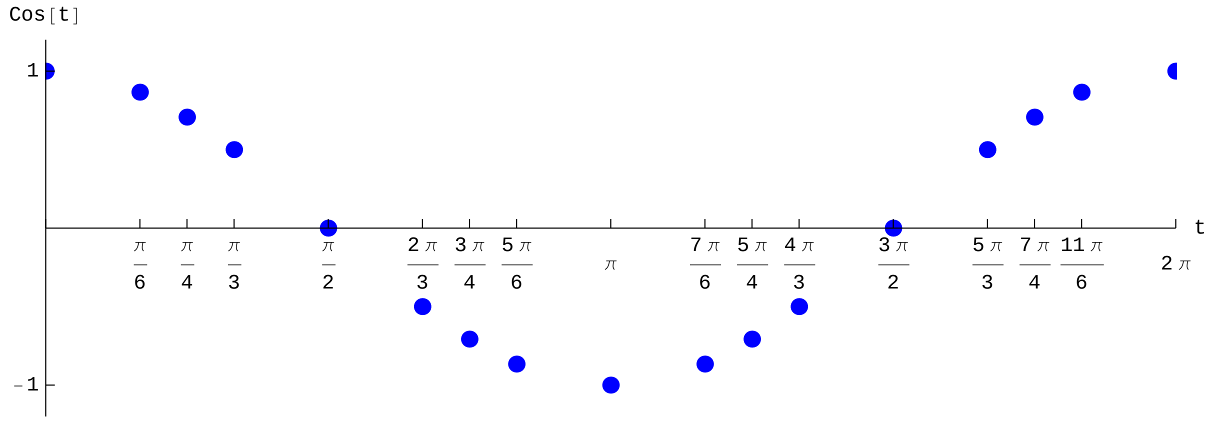
Extending to Quadrants II, III, and IV

We can continue this around the unit circle, to get the following known values of $\cos(t)$.

t_i	$\text{Cos}[t_i]$
0	1
$\frac{\pi}{6}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{\pi}{3}$	$\frac{1}{2}$
$\frac{\pi}{2}$	0
$\frac{2\pi}{3}$	$-\frac{1}{2}$
$\frac{3\pi}{4}$	$-\frac{1}{\sqrt{2}}$
$\frac{5\pi}{6}$	$-\frac{\sqrt{3}}{2}$
π	-1
$\frac{7\pi}{6}$	$-\frac{\sqrt{3}}{2}$
$\frac{5\pi}{4}$	$-\frac{1}{\sqrt{2}}$
$\frac{4\pi}{3}$	$-\frac{1}{2}$
$\frac{3\pi}{2}$	0
$\frac{5\pi}{3}$	$\frac{1}{2}$
$\frac{7\pi}{4}$	$\frac{1}{\sqrt{2}}$
$\frac{11\pi}{6}$	$\frac{\sqrt{3}}{2}$
2π	1

Here is a plot of the points we know:

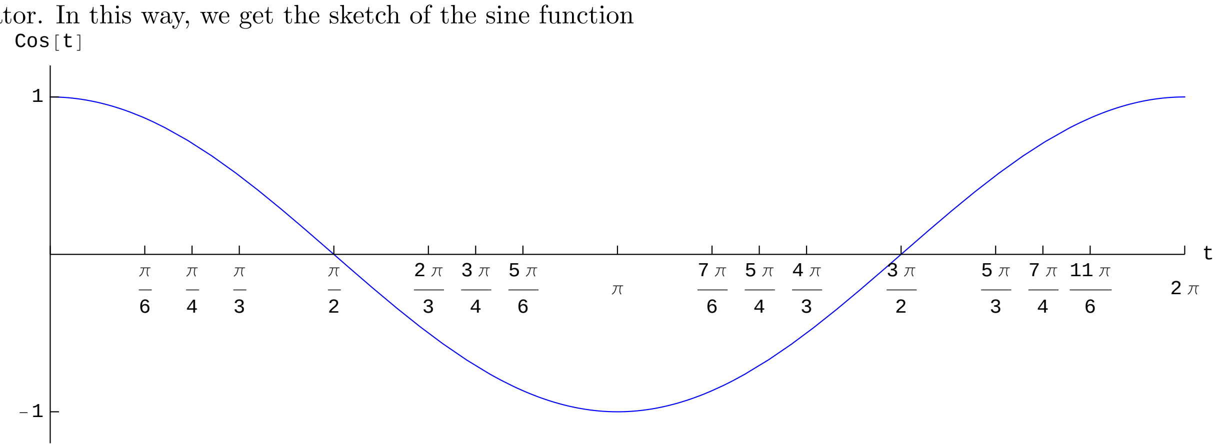
Out[22]=



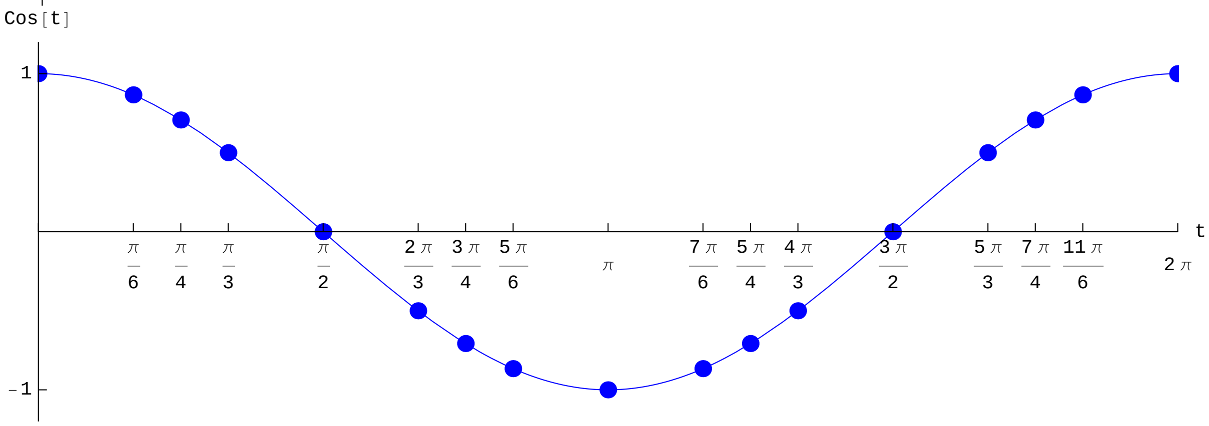
The Value of $\cos(t)$ at Other Angles

This gets us back to the point $t = 0$. To evaluate the value of $\cos(t)$ at points other than these special points, we can use a calculator. In this way, we get the sketch of the sine function

Out[23]=



Out[24]=



The function $\cos(t)$ will be periodic since the angles $t > 2\pi$will sweep out the same curve at t increases.