Example $y = \cos x$ is a periodic function with fundamental period (or just period) 2π.

$$\cos(x + 2\pi) = \cos x \cos 2\pi - \sin x \sin 2\pi = \cos x$$

The graph of $y = \cos x$ below is also obtained by plotting points for one period (could be for $0 \leq x \leq 2\pi$ or $\frac{-\pi}{2} \leq x \leq \frac{\pi}{2}$) then using the periodic nature of the function to complete the graph. Note that the domain of $y = \cos x$ is also $(-\infty, \infty)$ i.e all reals and range of f is the closed interval $[-1, 1]$. (Also recall $\cos x = 0$ if $x = n\pi/2$ where n is an odd integer)

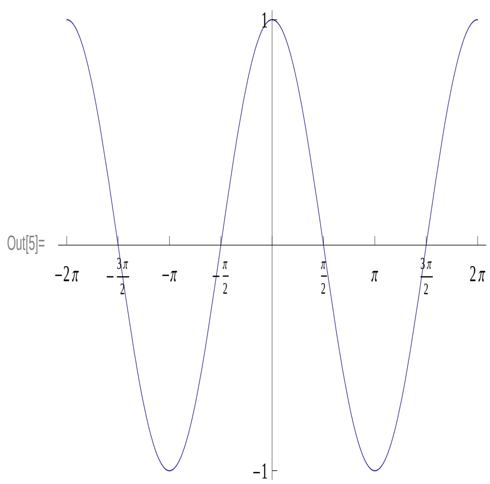

Figure 2: y=cos x

The graph of the remaining four trig functions are shown at the end of these lecture notes and their domains can be written directly looking at their graphs. Notice also that tangent and cotangent have range $(-\infty, \infty)$, where as cosecant and secant have range $(-\infty, -1] \cup [1, \infty)$. All four functions are periodic: tangent and cotangent have period π whereas cosecant and secant have period 2π.

Inverse Trigonometric Functions

When we try to find the the inverse of the trig. functions we have slight difficulty they are <u>not</u> 1-1. The solution out of this problem is to restrict the domain of these functions so that they become one to one. For an example apply the horizontal line test to the graph of $y = \sin x$ above. But the function $f(x) = y = \sin x$ for $-\pi/2 \leq x \leq \pi/2$ is 1-1.