

**Tangent line slopes for the sine function**

The goal here is to compute the tangent line slopes for the sine function. Here's the steps you should take:

1. Start with  $x = 0$ . Look at the graph of  $\sin(x)$  and estimate the slope of the tangent line at  $x = 0$ . Be careful to note the scales on the input and output axes.
2. Determine the tangent line slope at  $x = 0$  using the limit of a difference quotient. Get at least four decimal places in this limit. Put this value in the table below and plot the corresponding point on the axes provided.
3. Repeat steps 1 and 2 for the other values of  $x$  in the table.
4. Sketch a curve through the points you have plotted. To sketch this curve, you need to interpolate. Use the plot of the sine function to guide your interpolation. In particular, look at the tangent line slopes for values of  $x$  between the ones in the table.
5. Conjecture a function that might match the graph you have sketched. Compute outputs of this function for the values of  $x$  in the table. Put these output values in the table. Compare these with the tangent line slopes you computed.

$\theta$	computed slopes	outputs of matching function
0		
$\frac{\pi}{4}$		
$\frac{\pi}{2}$		
$\frac{3\pi}{4}$		
$\pi$		
$\frac{5\pi}{4}$		
$\frac{3\pi}{2}$		
$\frac{7\pi}{4}$		
$2\pi$		