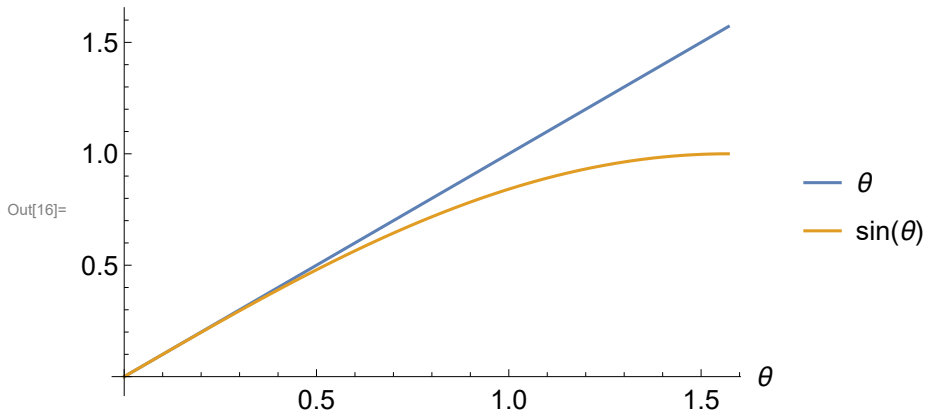


A comparison of θ and $\text{Sin}[\theta]$

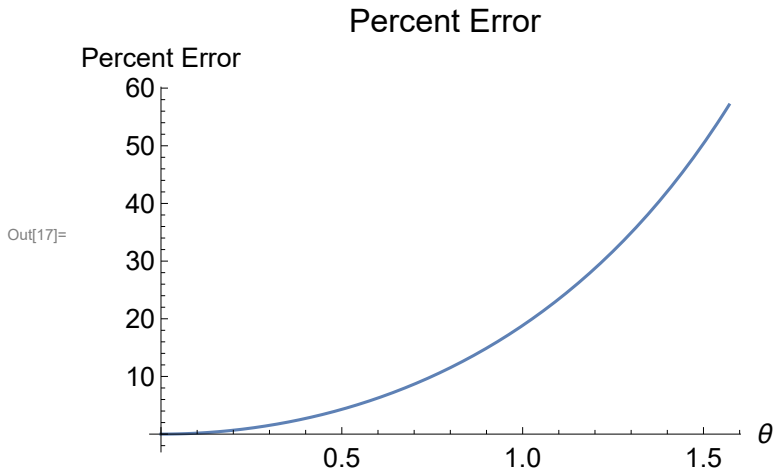
```
In[14]:= err[ $\theta$ _] := 100 * ( $\theta$  - Sin[ $\theta$ ]) / Sin[ $\theta$ ]
```

```
In[15]:= findangle[ $\text{tol}_$ ] := FindRoot[err[ $\theta$ ] ==  $\text{tol}$ , { $\theta$ , 1}][[1, 2]] / °
```

```
In[16]:= Plot[{ $\theta$ , Sin[ $\theta$ ]}, { $\theta$ , 0,  $\pi/2$ }, PlotLegends -> "Expressions",  
LabelStyle -> Larger, AxesLabel -> {" $\theta$ ", None}]
```



```
In[17]:= Plot[err[ $\theta$ ], { $\theta$ , 0,  $\pi/2$ }, PlotLabel -> "Percent Error",  
LabelStyle -> Larger, AxesLabel -> {" $\theta$ ", "Percent Error"}]
```



```
In[18]:= TableForm[Table[{ $\text{tol}$ , findangle[ $\text{tol}$ ]}, { $\text{tol}$ , {10, 1, 0.1, 0.01, 0.001, 0.0001}}],  
TableHeadings -> {None, {"Percent Error", "Angle (Degrees)"}}]
```

Out[18]/TableForm=

<u>Percent Error</u>	<u>Angle (Degrees)</u>
10	42.9138
1	13.9857
0.1	4.43656
0.01	1.40341
0.001	0.44381
0.0001	0.140345

If you have a pendulum clock and want to be off by at most one minute at the end of the day, the

relative accuracy is then:

```
In[19]:= 60 / 86400.
```

```
Out[19]= 0.000694444
```

which corresponds to an angle of less than 0.37 degrees:

```
In[20]:= findangle[%]
```

```
Out[20]= 0.369842
```