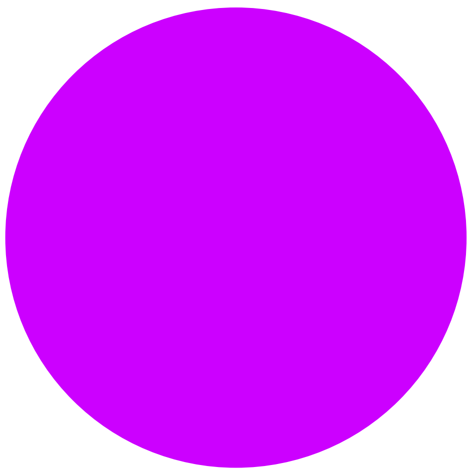
Here I demonstrate how to represent functions using colors.

Mathematica has many ways of communicating colors. The simplest one is Hue[]. The variable in Hue is between 0 and 1

In[63]:=
```
Graphics[{Hue[0.8], Disk[{0, 0}, 1]}, PlotRange → {{-1.5, 1.5}, {-1.5, 1.5}}]
```

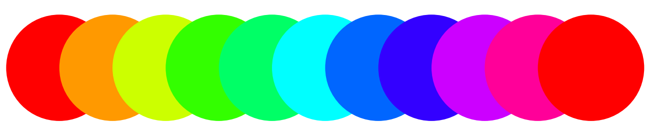
Out[63]=



Coloring 10 disks in different colors using Hue[]

In[64]:=
```
Graphics[Table[{Hue[k/10], Disk[{k, 0}, 1]}, {k, 0, 10}],
 PlotRange → {{-1.5, 11.5}, {-1.5, 1.5}}]
```

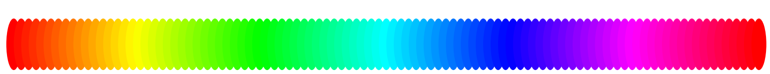
Out[64]=



Coloring 100 disks in different colors using Hue[]

In[65]:=
```
Graphics[Table[{Hue[k/100], Disk[{k, 0}, 1]}, {k, 0, 100}],
 PlotRange → {{-1.5, 101.5}, {-1.5, 1.5}}, ImageSize → 400, AspectRatio → 0.1]
```

Out[65]=



A convenient way of generating lists of numbers in Mathematica is offered by function Range

In[66]:=
```
Range[0, 1, 1 / 10]
```

Out[66]= $\left\{0, \frac{1}{10}, \frac{1}{5}, \frac{3}{10}, \frac{2}{5}, \frac{1}{2}, \frac{3}{5}, \frac{7}{10}, \frac{4}{5}, \frac{9}{10}, 1\right\}$

A convenient way of applying a function to a list is given by so called pure function. To make the Sin function into a pure function we write

In[67]:=
```
Sin[#] &
```

Out[67]=
```
Sin[#1] &
```

But, more importantly, here is how to make the square function into a pure function

In[68]:=
```
(#^2) &[2]
```

Out[68]= 4

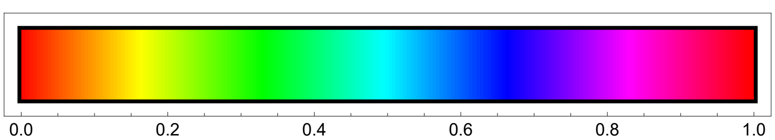
Apply the square to a list

In[69]:=
```
(#^2) & /@ Range[0, 1, 1 / 10]
```

Out[69]= $\left\{0, \frac{1}{100}, \frac{1}{25}, \frac{9}{100}, \frac{4}{25}, \frac{1}{4}, \frac{9}{25}, \frac{49}{100}, \frac{16}{25}, \frac{81}{100}, 1\right\}$

Demonstrating Hue[] on the unit interval using many rectangles.

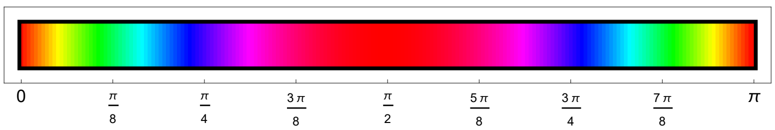
In[70]:=
```
st = 1/200; cc = 0.002; hh = 0.1; LL = 1; Graphics[{
  {Hue[#], Polygon[{{# - st/2 - cc, 0}, {# + st/2 + cc, 0}, {# + st/2 + cc, hh}, {# - st/2 - cc, hh},
       {# - st/2 - cc, 0}}]} & /@ Range[0 + st/2, LL - st/2, st], {Thickness[0.005],
   Line[{{0 - st/2, 0}, {LL + st/2, 0}, {LL + st/2, 0.1}, {0 - st/2, 0.1}, {0 - st/2, 0}}]}},
 Frame → True, FrameTicks → {{None, None}, {Automatic, None}},
 ImageSize → 400]
```

Out[70]=


This is the sin function using Hue

In[71]:=
```
st = Pi/200; cc = 0.002; hh = 0.2; LL = Pi; Graphics[{
  {Hue[Sin[#]], Polygon[{{# - st/2 - cc, 0}, {# + st/2 + cc, 0}, {# + st/2 + cc, hh}, {# - st/2 - cc, hh},
      {# - st/2 - cc, 0}}]} & /@ Range[0 + st/2, LL - st/2, st], {Thickness[0.005],
   Line[{{0 - st/2, 0}, {LL + st/2, 0}, {LL + st/2, hh}, {0 - st/2, hh}, {0 - st/2, 0}}]}},
 Frame → True, FrameTicks → {{None, None}, {Range[0, Pi, Pi/8], None}},
 ImageSize → 400]
```

Out[71]=



Next, I want to produce a coloring of the unit interval which will transition from white to red.

First, this is the Red Color

In[72]:=
```
RGBColor[1, 0, 0]
```

Out[72]=

This is the White Color

In[73]:=
```
RGBColor[1, 1, 1]
```

Out[73]=

How you transition from red to white is by using convex combination of vectors

In[74]:=
```
(t) * {1, 0, 0} + (1 - t) {1, 1, 1}
```

Out[74]=
```
{1, 1 - t, 1 - t}
```

At t = 0 we are at white

In[75]:=
```
((t) * {1, 0, 0} + (1 - t) {1, 1, 1}) /. {t → 0}
```

Out[75]=
```
{1, 1, 1}
```

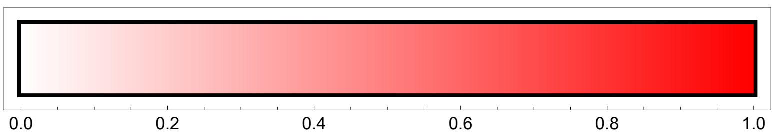
At t=1 we are red

In[76]:=
```
((t) * {1, 0, 0} + (1 - t) {1, 1, 1}) /. {t → 1}
```

Out[76]=
```
{1, 0, 0}
```

In[77]:=
```
st = 1/200; cc = 0.001; hh = 0.1; LL = 1; Graphics[{
  {RGBColor[1, 1 - #, 1 - #], Polygon[{{# - st/2 - cc, 0},
      {# + st/2 + cc, 0}, {# + st/2 + cc, hh}, {# - st/2 - cc, hh}, {# - st/2 - cc, 0}}]} & /@
   Range[0 + st/2, LL - st/2, st], {Thickness[0.005],
   Line[{{0 - st/2, 0}, {LL + st/2, 0}, {LL + st/2, 0.1}, {0 - st/2, 0.1}, {0 - st/2, 0}}]}},
 Frame → True, FrameTicks → {{None, None}, {Automatic, None}},
 ImageSize → 400]
```

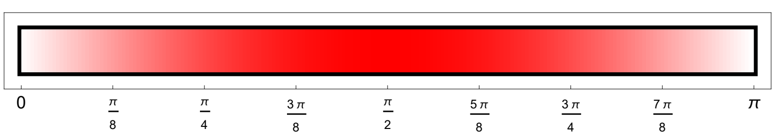
Out[77]=



This is the sin function from 0 - white to 1 - red in the shades of red.

In[78]:=
```
st = Pi/200; cc = 0.002; hh = 0.2; LL = Pi; Graphics[{
  {RGBColor[1, 1 - Sin[#], 1 - Sin[#]], Polygon[{{# - st/2 - cc, 0},
      {# + st/2 + cc, 0}, {# + st/2 + cc, hh}, {# - st/2 - cc, hh}, {# - st/2 - cc, 0}}]} & /@
   Range[0 + st/2, LL - st/2, st], {Thickness[0.005],
   Line[{{0 - st/2, 0}, {LL + st/2, 0}, {LL + st/2, hh}, {0 - st/2, hh}, {0 - st/2, 0}}]}},
 Frame → True, FrameTicks → {{None, None}, {Range[0, Pi, Pi/8], None}},
 ImageSize → 400]
```

Out[78]=



These are the powers of Sin[x] function from 0 - white to 1 - red in the shades of red.

In[79]:=
```
st = Pi/200; cc = 0.002; hh = 0.2; LL = Pi;
Manipulate[Graphics[{
   {RGBColor[1, 1 - (Sin[#])^nn, 1 - (Sin[#])^nn],
       Polygon[{{# - st/2 - cc, 0}, {# + st/2 + cc, 0}, {# + st/2 + cc, hh}, {# - st/2 - cc, hh},
         {# - st/2 - cc, 0}}]} & /@ Range[0 + st/2, LL - st/2, st], {Thickness[0.005],
     Line[{{0 - st/2, 0}, {LL + st/2, 0}, {LL + st/2, hh}, {0 - st/2, hh}, {0 - st/2, 0}}]}},
  Frame → True, FrameTicks → {{None, None}, {Range[0, Pi, Pi/8], None}},
  ImageSize → 400],
 {nn, Range[1, 20], Setter, ControlPlacement → Top}]
```

Out[80]=