ASSIGNMENT-CHAPTER 3

EXERCISES -3.2

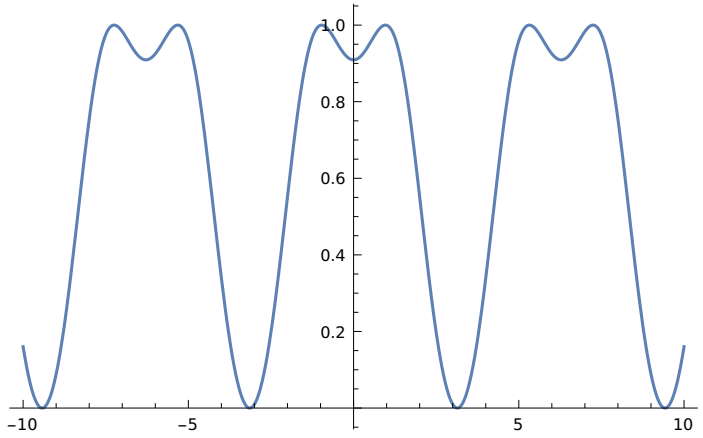
1. Plot the following functions on the domain -10 ≤ x ≤ 10.

(a) sin(1+cos(x))

In[1]:=
```
f[x_] := Sin[1 + Cos[x]]
```

In[2]:=
```
Plot[f[x], {x, -10, 10}]
```

Out[2]=

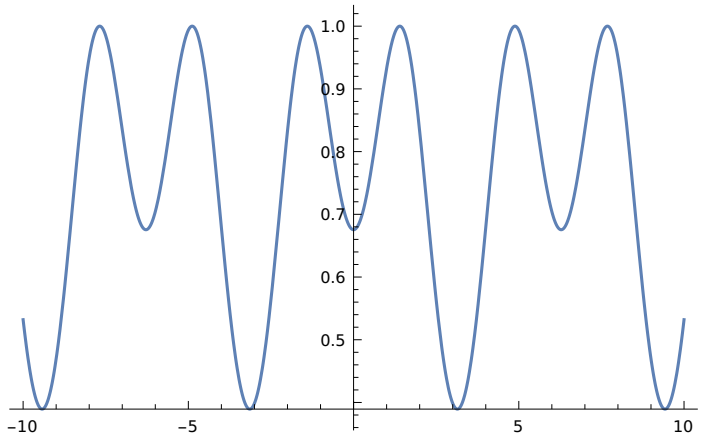


(b) sin(1.4 +cos(x))

In[4]:=
```
g[x_] := Sin[1.4 + Cos[x]]
```

In[5]:=
```
Plot[g[x], {x, -10, 10}]
```

Out[5]=

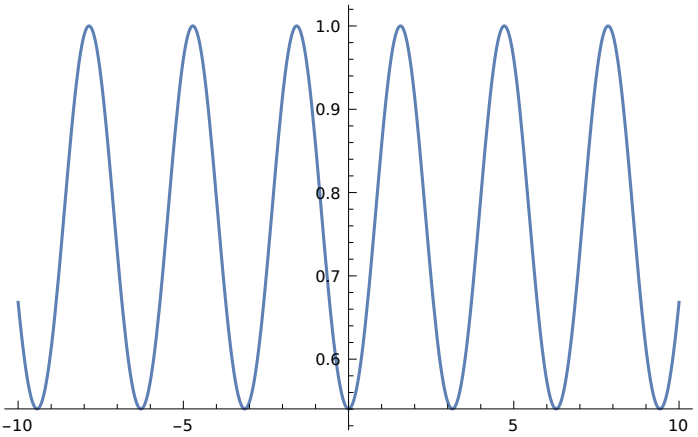


(c) sin(π /2+cos(x))

In[6]:=
```
h[x_] := Sin[π / 2 + Cos[x]]
```

In[7]:=
```
Plot[h[x], {x, -10, 10}]
```

Out[7]=

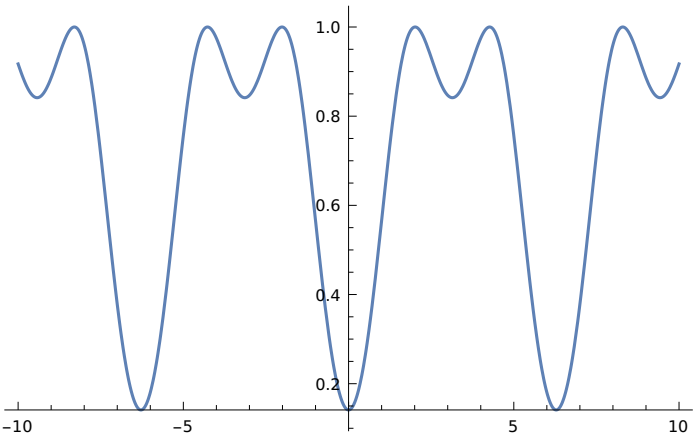


(d) sin(2+cos(x))

In[8]:=
```
f[x_] := Sin[2 + Cos[x]]
```

In[9]:=
```
Plot[f[x], {x, -10, 10}]
```

Out[9]=

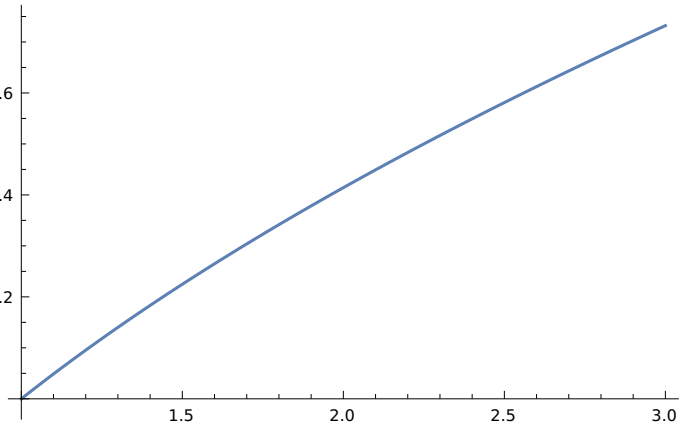


2. Consider the square root function f(x) = $\sqrt{x}$ when x is near 2.

(a) Graph of f as x goes from 1 to 3.

In[10]:=
```
With[{δ = 10^0}, Plot[√x, {x, 2 - δ, 2 + δ}]]
```

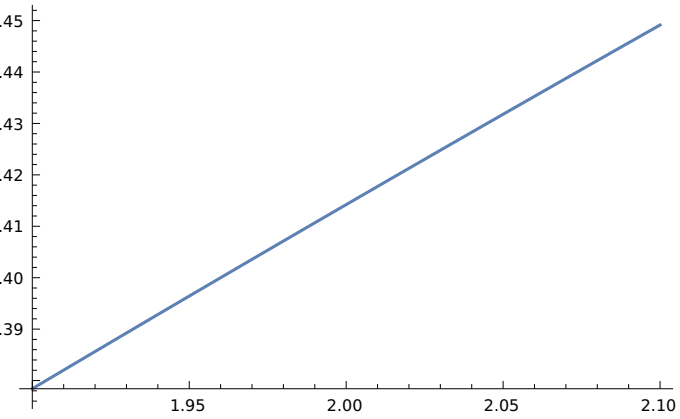
Out[10]=



(b) Change the value of δ to be 10^-1, 10^-2, 10^-3 and see the graph of f as x goes from 1.9 to 2.1

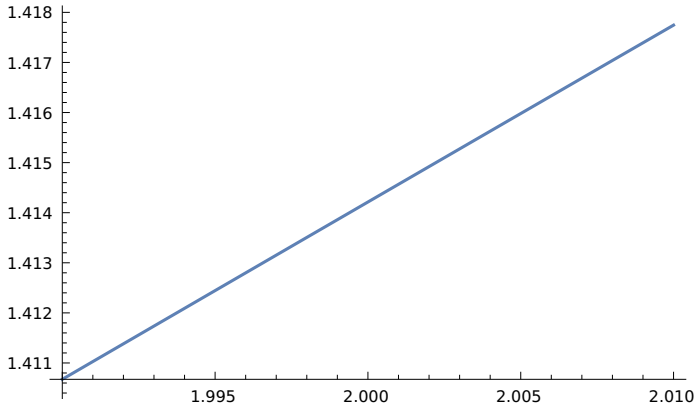
In[11]:=
```
With[{δ = 10^-1}, Plot[√x, {x, 2 - δ, 2 + δ}]]
```

Out[11]=



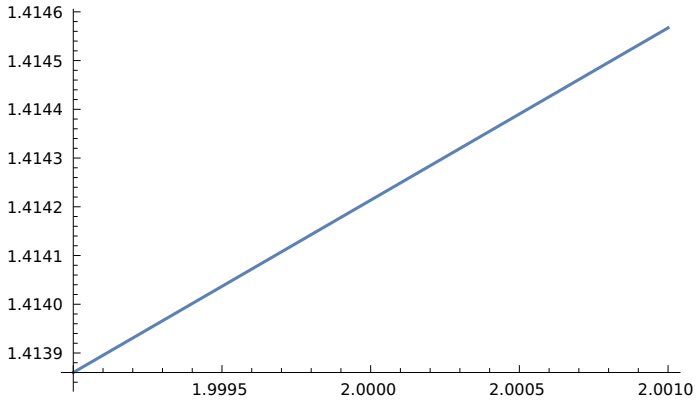
In[12]:=
```
With[{δ = 10^-2}, Plot[√x, {x, 2 - δ, 2 + δ}]]
```

Out[12]=



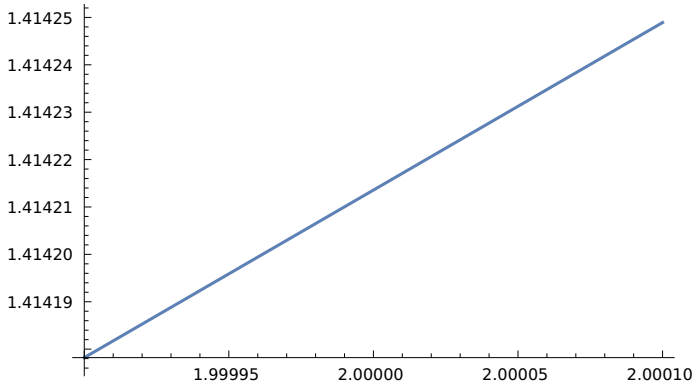
In[13]:=
```
With[{δ = 10^-3}, Plot[√x, {x, 2 - δ, 2 + δ}]]
```

Out[13]=



In[21]:=
```
With[{δ = 10^-4}, Plot[√x, {x, 2 - δ, 2 + δ}]]
```

Out[21]=



(c) Use the last plot to approximate $\sqrt{2}$ to six significant digits. Check your answer using N.

By the above plot we can approximate $\sqrt{2} = 1.41421$

In[20]:=
```
N[√2, 6]
```

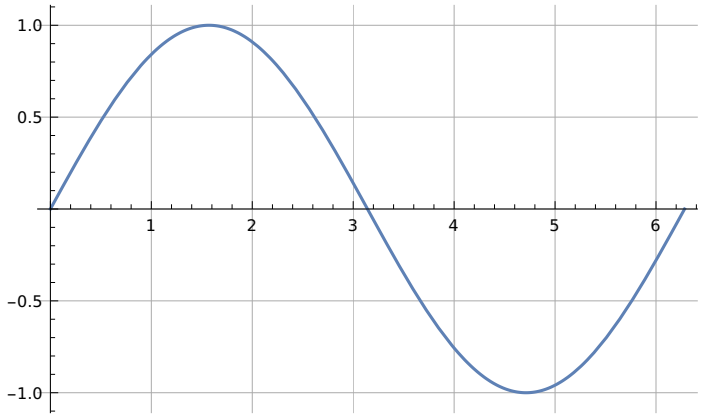
Out[20]=
```
1.41421
```

EXERCISE -3.3

1. Use the GridLines and Ticks options, as well as the setting GridLinesStyle→ Lighter[Gray] to plot the sine function.

In[26]:=
```
Plot[Sin[x], {x, 0, 2 π}, GridLines → Automatic ,
 Ticks → Automatic , GridLinesStyle → Lighter[Gray]]
```

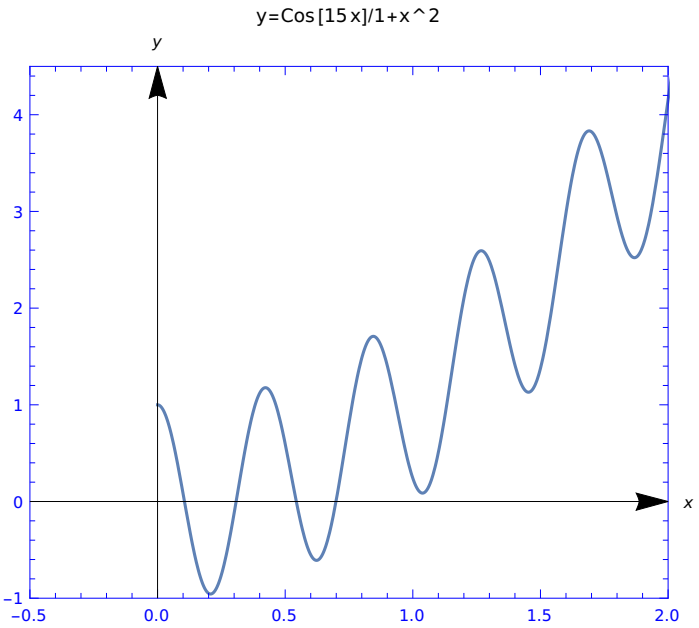
Out[26]=



2. Use the Axes , Frame , Filling , FrameStyle , PlotRange and AspectRatio options to plot y= cos(15 x)/1+x^2

In[67]:=
```
Plot[Cos[15 x] / 1 + x ^ 2, {x, 0, π}, PlotRange → {{-0.5, 2}, {-1, 4.5}},
 Frame → True, AxesStyle → Arrowheads[00.05], AspectRatio → 5 / 6, Axes → True,
 AxesLabel → {x, y}, PlotLabel → "y=Cos[15x]/1+x^2", FrameStyle → Blue]
```

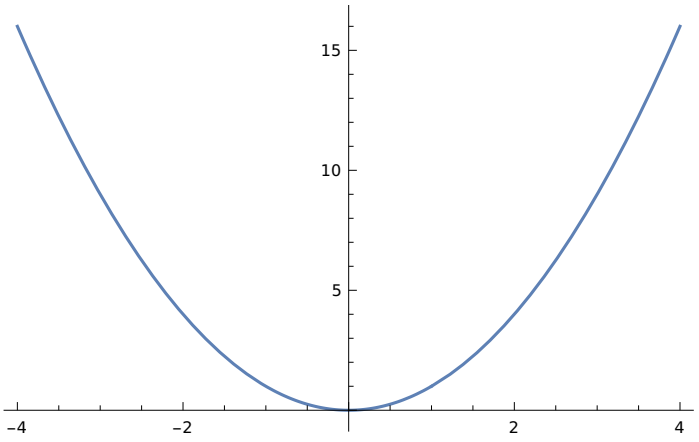
Out[67]=



4.Plot the function f(x) = x^2 on the domain -2 ≤ x ≤ 2 and set Exclusions to x=1

In[70]:=
```
Plot[x ^ 2, {x, -4, 4}, Exclusions → {x == 1}]
```

Out[70]=

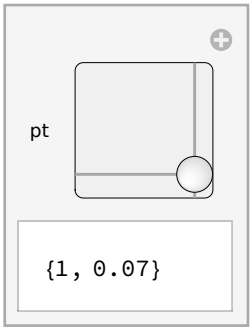


EXERCISES-3.4

1. Make a Manipulate has output {x,y}, but has a single Slider2D controller.

In[5]:=
```
Manipulate[pt, {pt, {0, 0}, {1, 1}}]
```

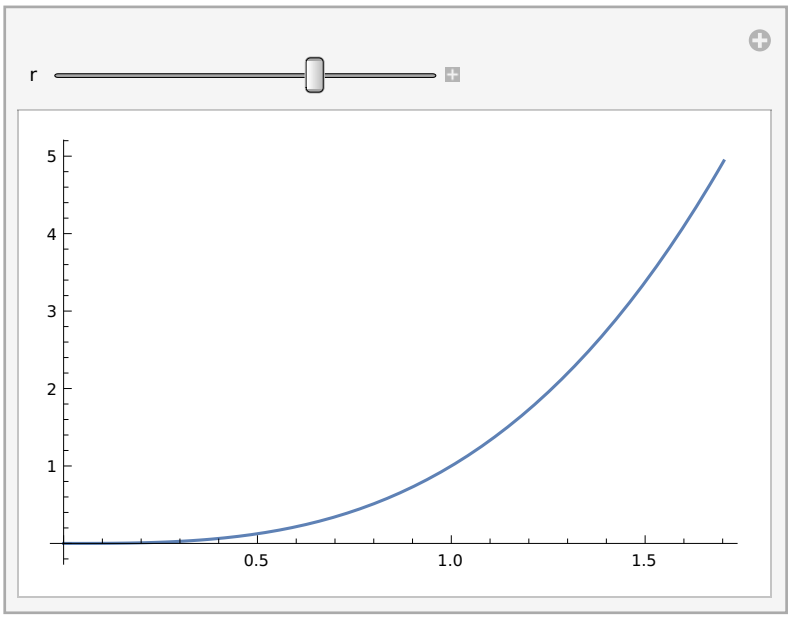
Out[5]=



2. Make a Manipulate of a Plot where the user can adjust the AspectRatio in real time from a starting value of 1/5 to an ending value of 5. Set ImageSize to {Automatic 128} so the height remains constant as the slider is moved.

In[81]:=
```
Manipulate[Plot[x^3, {x, 0, r}], {r, 1, 2}, ImageSize → {Automatic 128}, AspectRatio → 5/6]
```

Out[81]=



EXERCISES -3.5

1. (a) Enter the followings inputs:

Range[100] and Partition[Range[100],10]

In[82]:=
```
Range[100]
```

Out[82]=
```
{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,
 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61,
 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81,
 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100}
```

In[83]:=
```
Partition[Range[100], 10]
```

Out[83]=
```
{{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {11, 12, 13, 14, 15, 16, 17, 18, 19, 20},
 {21, 22, 23, 24, 25, 26, 27, 28, 29, 30}, {31, 32, 33, 34, 35, 36, 37, 38, 39, 40},
 {41, 42, 43, 44, 45, 46, 47, 48, 49, 50}, {51, 52, 53, 54, 55, 56, 57, 58, 59, 60},
 {61, 62, 63, 64, 65, 66, 67, 68, 69, 70}, {71, 72, 73, 74, 75, 76, 77, 78, 79, 80},
 {81, 82, 83, 84, 85, 86, 87, 88, 89, 90}, {91, 92, 93, 94, 95, 96, 97, 98, 99, 100}}
```

(b) Format a table for the first 100 integers,with twenty digits per row.

In[13]:=
```
Partition[Range[100], 20]
```

Out[13]=
```
{{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20},
 {21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40},
 {41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60},
 {61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80},
 {81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100}}
```

(c) Make a same table as above, but use only Table and Range commands.

In[25]:=
```
Table[Range[20], 1]
Table[Range[20, 40], 1]
```

Out[25]=
```
{{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}}
```

Out[26]=
```
{{20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40}}
```

(d) Make a same table as above, but use only Table command (twice).

In[101]:=
```
Table[x, {x, 1, 100}]
```

Out[101]=
```
{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42,
 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62,
 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81,
 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100}
```

4. (a) Use the Sum command to evaluate the following expression: 1^3+2^3+3^3+4^3+5^3+6^3+7^3+8^3+9^3+10^3+11^3+12^3+13^3+14^3+15^3+16^3+17^3+18^3+19^3+20^3

In[127]:=
```
f[x_] := x^3
```

In[128]:=
```
Sum[f[x], {x, 1, 20}]
```

Out[128]= 44 100

(b) Make a Table of values for x=1,2,...,10 for the function f(x) =1^x+2^x+3^x+4^x+5^x+6^x+7^x+8^x+9^x+10^x+11^x+12^x+13^x+14^x+15^x+16^x+17^x+18^x+19^x+20^x

In[29]:=
```
f[x_] := 1^x + 2^x + 3^x + 4^x + 5^x + 6^x + 7^x + 8^x + 9^x +
  10^x + 11^x + 12^x + 13^x + 14^x + 15^x + 16^x + 17^x + 18^x + 19^x + 20^x
```

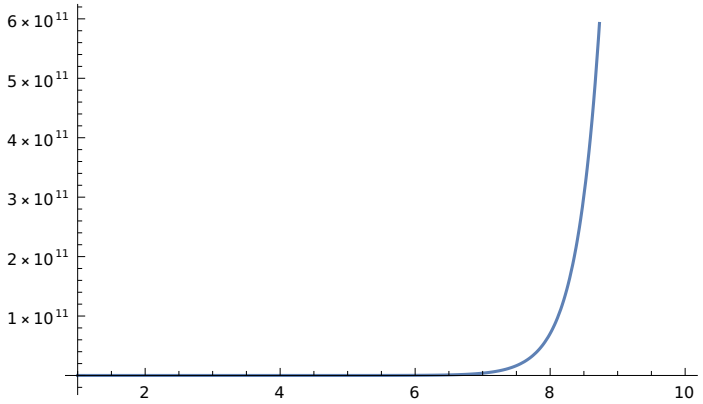
In[30]:=
```
Table[f[x], {x, 1, 10}]
```

Out[30]= {210, 2870, 44 100, 722 666, 12 333 300, 216 455 810,
3 877 286 700, 70 540 730 666, 1 299 155 279 940, 24 163 571 680 850}

(c) Plot f(x) on the domain 1≤ x ≤10.

In[31]:=
```
Plot[f[x], {x, 1, 10}]
```

Out[31]=



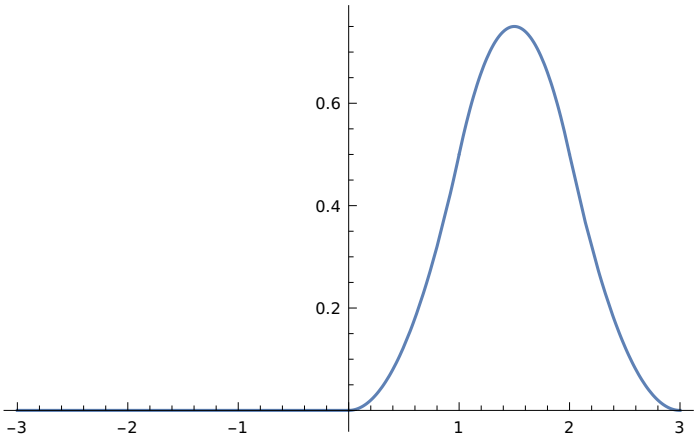
EXERCISES -3.6

2. Make a plot of a piecewise function.

In[33]:=
```
f[x_] := Piecewise[{{0, x < 0}, {x^2/2, 0 ≤ x < 1},
    {-x^2 + 3 x - 3/2, 1 ≤ x < 2}, {(1/2)(3 - x)^2, 2 ≤ x < 3}, {0, x ≤ 3}}]
```

In[34]:=
```
Plot[f[x], {x, -3, 3}]
```

Out[34]=



3. Make a plot of the step function.

In[23]:=
```
f[x_] := Floor[x]
```

In[24]:=
```
Plot[f[x], {x, 0, 20}]
```

Out[24]=