MAT/19/59 JASNOOR KAUR CHHABRA

EX-3.2

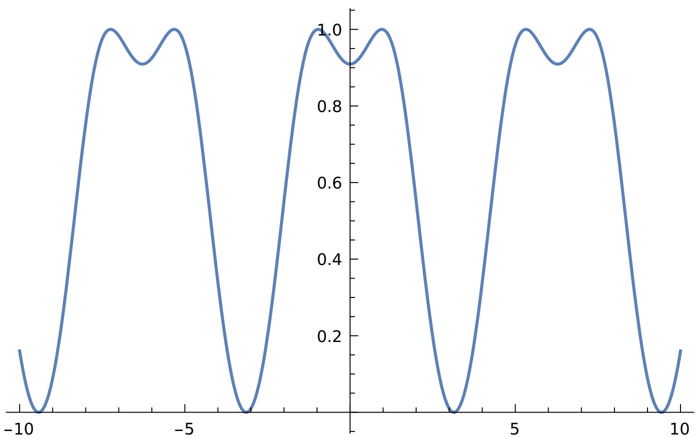
Q1- PLOT THE FOLLOWING FUNCTIONS ON THE DOMAIN -10<=X<=10.

A)- sin(1+cos(x))

In[26]:=
```
f[x_] := Sin[1 + Cos[x]]
```

In[27]:=
```
Plot[f[x], {x, -10, 10}]
```

Out[27]=

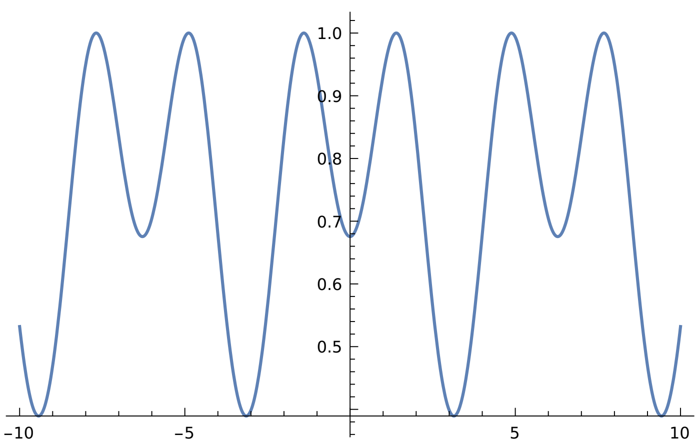


B)- sin(1.4+cos(x))

In[28]:=
```
g[x_] := Sin[1.4 + Cos[x]]
```

In[29]:=
```
Plot[g[x], {x, -10, 10}]
```

Out[29]=

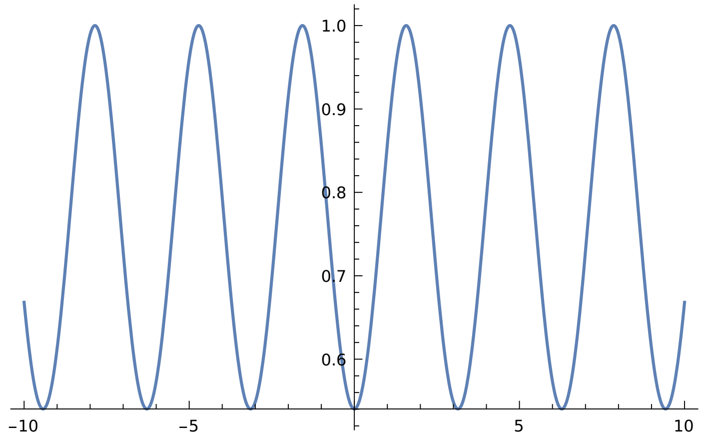


C)- sin (pi/2+cos(x)

In[30]:=
```
h[x_] := Sin[Pi / 2 + Cos[x]]
```

In[31]:=
```
Plot[h[x], {x, -10, 10}]
```

Out[31]=

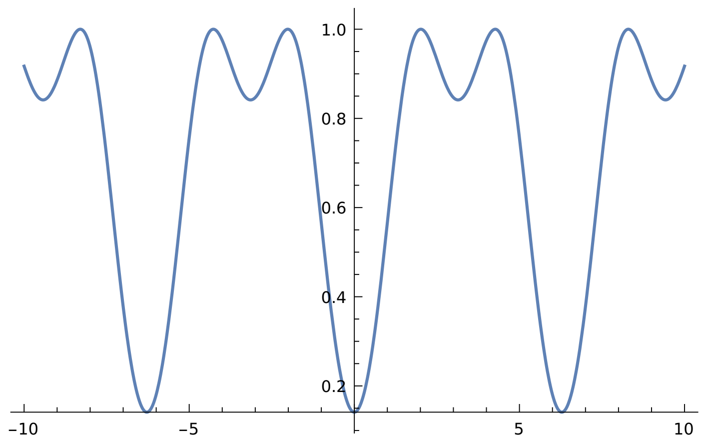


D)- sin(2+cos(x))

In[32]:=
```
f[x_] := Sin[2 + Cos[x]]
```

In[33]:=
```
Plot[f[x], {x, -10, 10}]
```

Out[33]=

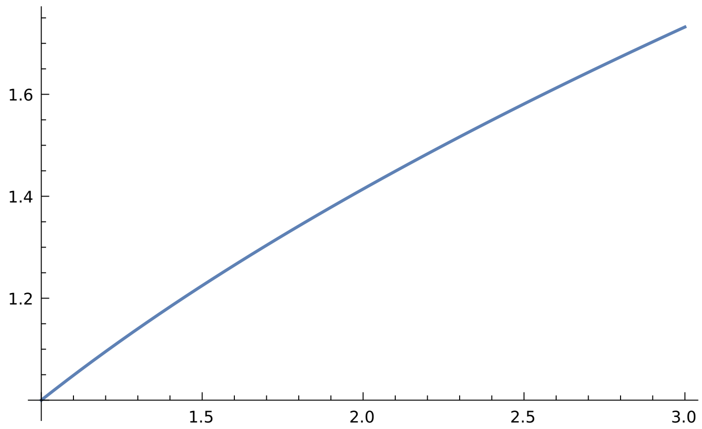


Q)2- CONSIDER THE SQUARE ROOT FUNCTION f(x)= $\sqrt{x}$, when x is near 2.

a)- graph of f as x goes from 1 to 3

In[35]:=
```
With[{δ = 10 ^ 0}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

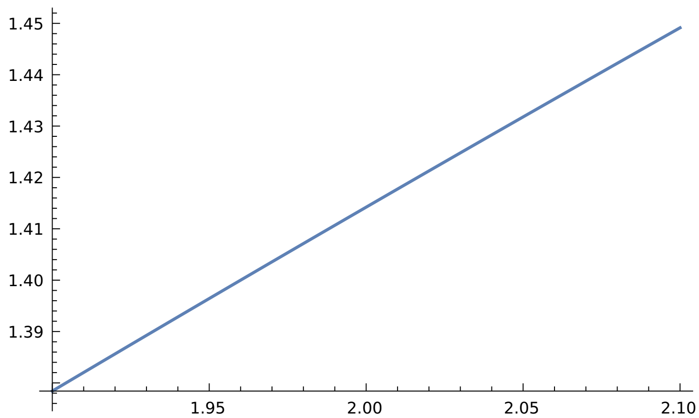
Out[35]=



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

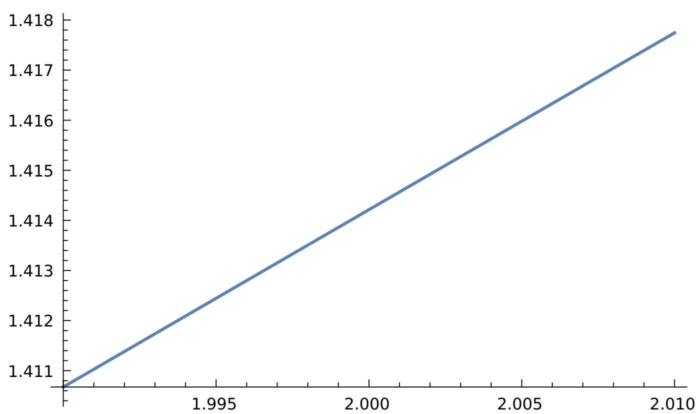
In[37]:=
```
With[{δ = 10 ^ -1}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

Out[37]=



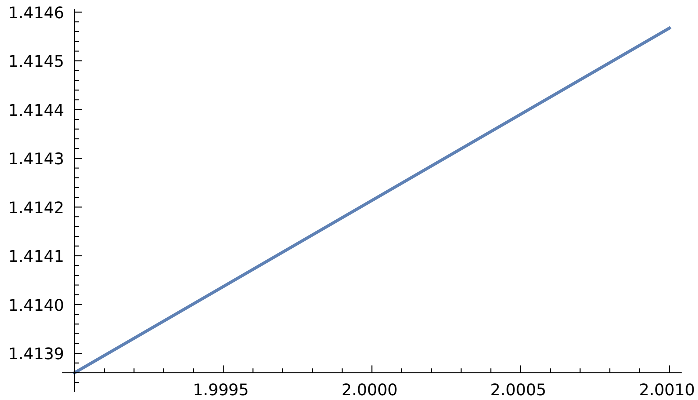
In[38]:=
```
With[{δ = 10 ^ -2}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

Out[38]=



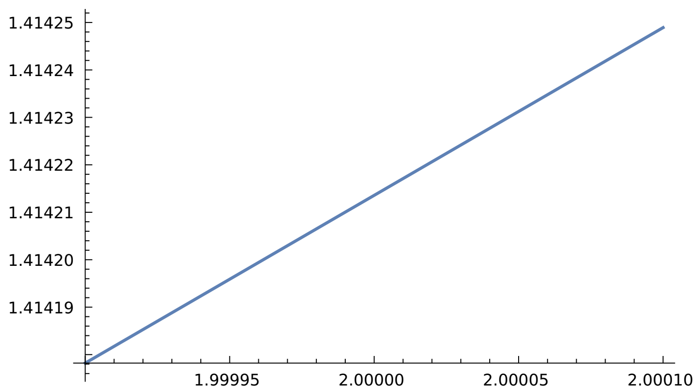
In[39]:=
```
With[{δ = 10^-3}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

Out[39]=



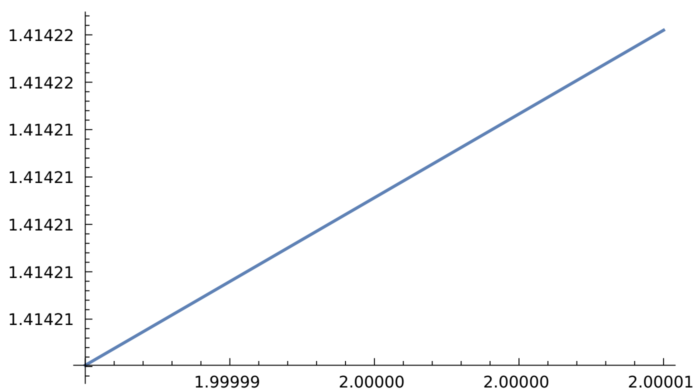
In[40]:=
```
With[{δ = 10^-4}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

Out[40]=



In[41]:=
```
With[{δ = 10^-5}, Plot[Sqrt[x], {x, 2 - δ, 2 + δ}]]
```

Out[41]=



c)-USE THE LAST PLOT TO APPROXIMATE $\sqrt{2}$ TOSIX SIGNIFICANT DIGITS. CHECK YOUR ANSWER USING N.

- BY THE ABOVE PLOTS WE CAN APPROXIMATE THAT $\sqrt{2}$=1.41421

In[42]:=
```
N[√2, 6]
```

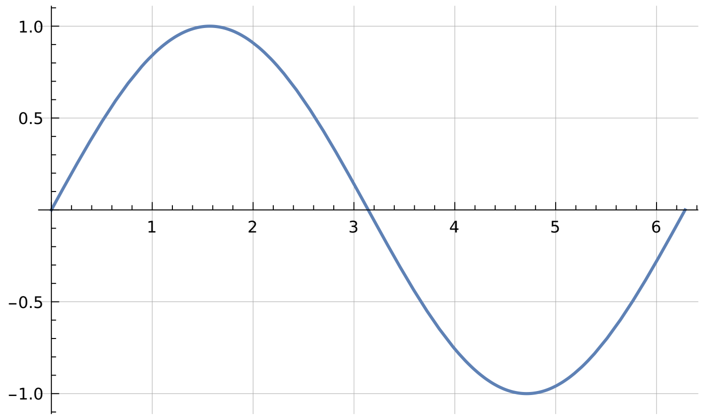
Out[42]=
```
1.41421
```

EX- 3.3

Q1-USE THE GRID LINES AND THE TICK OPTIONS AS WELL AS

```
In[57]:= Plot[Sin[x], {x, 0, 2 * Pi}, GridLines → Automatic ,
 Ticks → Automatic , GridLinesStyle → Lighter [Gray]]
```

Out[57]=

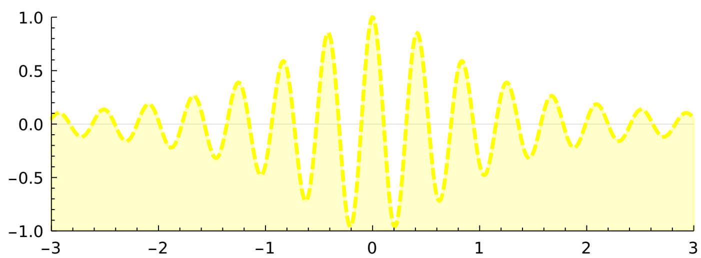


Q2)- USE THE AXES ,FRAME, FILLING, FRAMESTYLE, PLOTRANGE AND ASPECTRATIO OPTIONS TO PLOT Y=Cos(15x)/1+x^2

```
In[58]:= f[x_] := Cos[15 * x] / (1 + x ^ 2)

In[60]:= Plot[f[x], {x, -3, 3}, Axes → True, Frame → False, Filling → {Axis},
 PlotStyle → Directive [Thick, Yellow, Dashed], AspectRatio → Automatic ,
 AxesOrigin → {-3, -1}, GridLines → {{}, {0.0}}, PlotRange → {{-3, 3}, {-1, 1}}]
```

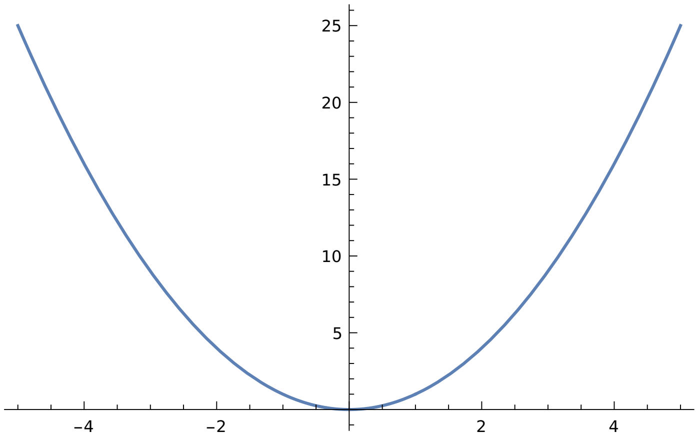
Out[60]=



Q4)- PLOT THE FUNCTION f(x)=x^2 on the Domain -2<= x<=2 AND SET EXCLUSIONS TO x = 1

In[61]:=
```
Plot[x^2, {x, -5, 5}, Exclusions → {x == 1}]
```

Out[61]=

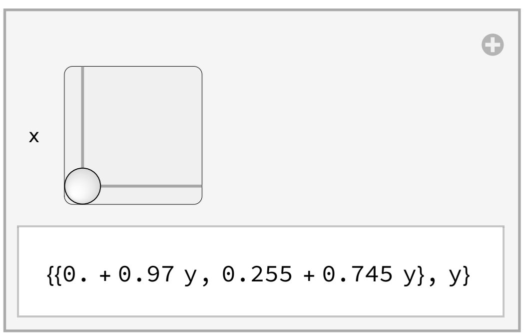


3.4

1)- THE FOLLOWING SIMPLE MANIPULATE HAS TWO SLIDERS : ONE FOR x AND ONE FOR y. MAKE A MANIPULATE THAT ALSO HAS OUTPUT {x,y} , BUT THAT HAS A SINGLE 2D CONTROLLER.

In[62]:=
```
Manipulate[{x, y}, {x, y, {0, 1}}]
```

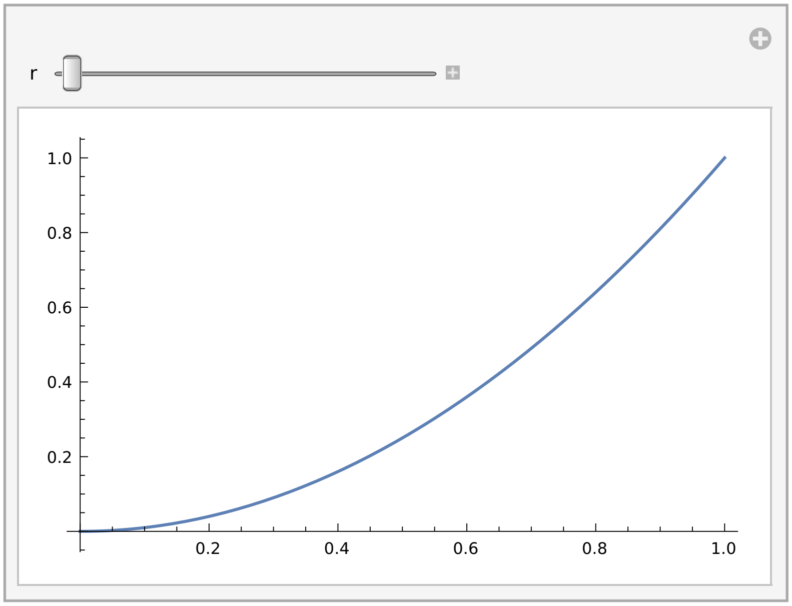
Out[62]=



2)- MAKE A MANIPULATE OF THE PLOT WHERE THE USER CAN ADJUST THE ASPECTRATIO IN REAL TIME, FROM A STARTING VALUE OF 1/5(FIVE TIMES WIDE AS IT IS TALL)TO AN ENDING VALUE OF 5(FIVE TIMES TALL AS IT WIDE). SET ImageSize TO AUTOMATIC,128 SO HEIGHT REMAINS CONSTANT AS THE SLIDER IS MOVED.

```
Manipulate[Plot[x^2, {x, 0, r}], {r, 1, 3}, ImageSize → {Automatic128}, AspectRatio → 5/6]
```

Out[63]=



3.5

Q1)THE PARTITION COMMAND IS USED TO BREAK A SINGLE LIST INTO SUBLISTS OF EQUAL LENGTH, IT IS USEFULL FOR BREAKING UP A LIST INTO ROWS FOR DISPLAYS WITHIN A GRID.

a)- ENTER THE FOLLOWING INPUTS AND DISCUSS THE OUTPUTS.

```
In[64]:= Range[100]

Out[64]= {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[65]:= Partition[Range[100], 10]

Out[65]= {{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)- FORM A TABLE OF FIRST 100 INTEGERS , WITH TWENTY DIGITS PER ROW. THE FIRST TWO ROWS , FOR EXAMPLE, SHOULD LOOK LIKE THIS :

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

In[66]:=
```
Table[x, {x, 1, 100}]
```
Out[66]=
```
{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[67]:=
```
Partition[Table[x, {x, 1, 100}], 20]
```
Out[67]=
```
{{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 THE SAME TABLE AS ABOVE BUT USE ONLY THE TABLE AND RANGE COMMAND

In[68]:=
```
Table[Range[10], 10]
```
Out[68]=
```
{{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10},
 {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10},
 {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10},
 {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}}
```

d)- MAKE THE SAME TABLE AS ABOVE BUT USE ONLY THE TABLE COMMAND TWICE , DONT USE PARTITION OR RANGE.

In[69]:=
```
Table[Table[x, {x, 1, 100}]]
```
Out[69]=
```
{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}
```

Q4)- THE SUM COMMAND HAS A SYNTAX SIMILAR TO THAT OF TABLE

a)- USE THE SUM COMMAND TO EVALUATE THE FOLLOWING EXPRESSION:-

In[70]:=
```
f[x_] := x^3
```

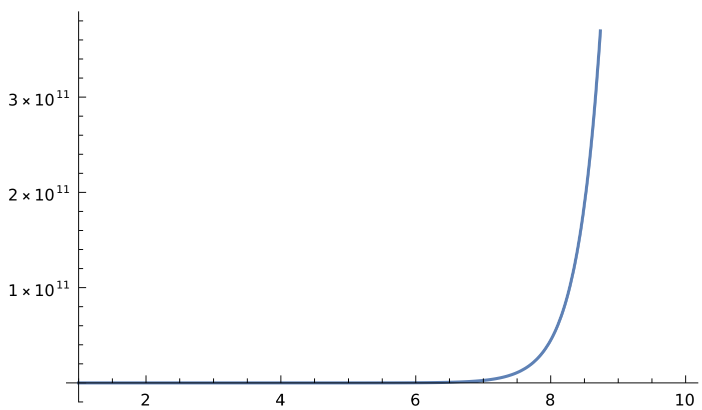
In[71]:=
```
Sum[f[x], {x, 1, 20}]
```
Out[71]= 44 100

b)- MAKE A TABLE OF VALUES FOR X=1,2,..........,10 FOR THE FUNCTION
f(x)= 1+2^x+3^x+4^x+5^x+6^x+7^x+8^x+9^....................................x+17^x+18^x+19^x+20

In[72]:=
```
f[x_] := 1 + 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
```
In[73]:=
```
Table[f[x], {x, 1, 10}]
```
Out[73]= {210 , 2490 , 36 120 , 562 686 , 9 133 320 , 152 455 830 ,
 2 597 286 720 , 44 940 730 686 , 787 155 279 960 , 13 923 571 680 870 }

c)- PLOT f(x) ON THE DOMAIN 1<=x<=10

In[74]:=
```
f[x_] := 1 + 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
```
In[75]:=
```
Plot[f[x], {x, 1, 10}]
```
Out[75]=



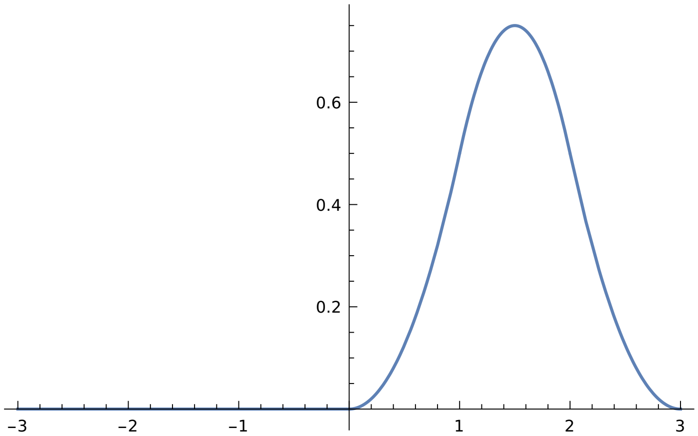
3.6

Q2)- MAKE THE PLOT OF A PIECEWISE FUNCTION BELOW AND COMMENT ON ITS SHAPE.

In[97]:=
```
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[98]:=
```
Plot[f[x], {x, -3, 3}]
```

Out[98]=



Q3)- A STEP FUNCTION ASSUMES A CONSTANT VALUE BETWEEN CONSECUTIVE INTEGERS N AND N+1. MAKE A PLOT OF THE STEP FUNCTION f(x) WHOSE VALUE IS N^2 WHEN N <= X<N+1

In[101]:=
```
f[x_] := Piecewise [{{n ^ 2, n ≤ x < n + 1}, {1, n ≤ x ≤ n + 1}}]
```

In[102]:=
```
Plot[f[x], {x, 0, 20}]
```

Out[102]=