```
f[x_] := Expand[((x^3) - 1) / (x - 1)] (*el limite de la funcion f1 cuando x tiende
  a 0 es igual a 1 y coincide el valor de la funcion para ese punto;
 el limite cuando x tiende a 1 es 3 y es un hueco que no se ve en
  la grafica porque la funcion no esta definida en ese punto;
 el limite cuando x tiende a 2 tambien esta definido y
  coincide con el valor de la funcion para ese punto*)
```

In[27]:=

```
Limit[f[x], x → 0]
```

Out[27]= 1

In[31]:=

```
Limit[f[x], x → 1]
```

Out[31]= 3

In[32]:=

```
Limit[f[x], x → 2]
```

Out[32]= 7

```
Limit[f[x], x → 0];
f[0];
Limit[f[x], x → 1];
f[1];
Limit[f[x], x → 2];
f[2];
TableForm[Table[{x, f[x]}, {x, 0.99999, 1.00001, 0.000001}], {1, 1 / 0.0000001}]
(*La funcion es indeterminada cuando x
 tiende a 1 pero se ve que se va a acercando a 3*)
```

Power::infy : Infinite expression $\frac{1}{0}$ encountered. ≫

Infinity::indet : Indeterminate expression 0 ComplexInfinity encountered. ≫

Power::infy : Infinite expression $\frac{1}{0.}$ encountered. ≫

Infinity::indet : Indeterminate expression 0. ComplexInfinity encountered. ≫

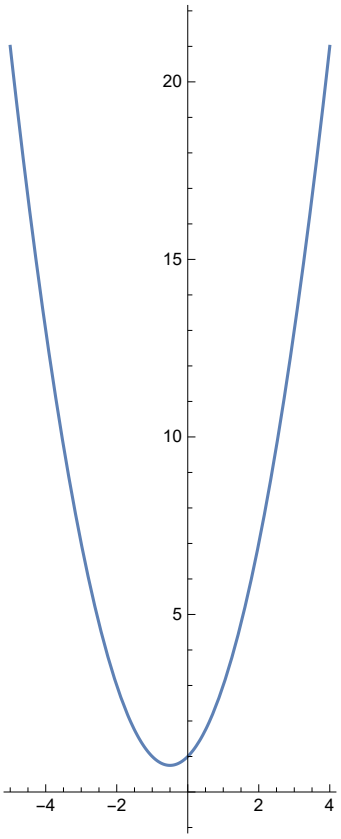
Out[194]//TableForm=

0.99999	2.99997
0.999991	2.99997
0.999992	2.99998
0.999993	2.99998
0.999994	2.99998
0.999995	2.99999
0.999996	2.99999
0.999997	2.99999
0.999998	2.99999
0.999999	3.
1.	Indeterminate
1.	3.
1.	3.00001
1.	3.00001
1.	3.00001
1.00001	3.00002
1.00001	3.00002
1.00001	3.00002
1.00001	3.00002
1.00001	3.00003
1.00001	3.00003

In[113]:=

```
Plot[f[x], {x, -5, 4}, AspectRatio → Automatic]
```

Out[113]=




```
f1[x_] := Expand[((x^2) - (5 x) + 6) / (x - 3)]
(*El limite cuando x tiende a 1 coincide con el valor de la funcion y es igual a -
 1; el limite cuando x tiende a 2 coincide tambien con el valor
 de la funcion y es igual a 7; y el limite cuando x tiende a 3 es
 igual a 13 y es un punto que no esta definido en la funcion*)

Limit[f1[x], x → 1]
```

Out[132]= −1

In[304]:=
```
Limit[f1[x], x → 2]
```

Out[304]= 0

In[305]:=
```
Limit[f1[x], x → 3]
```

Out[305]=
```
1
```

In[306]:=
```
Limit[f1[x], x → 1];
f1[1];
Limit[f1[x], x → 2];
f1[2];
Limit[f1[x], x → 3];
f1[3];
TableForm[Table[{x, f1[x]}, {x, 2.99999, 3.00001, 0.000001}], {2, 2 / 0.15}]
```

Power::infy : Infinite expression $\frac{1}{0}$ encountered. ≫

Infinity::indet : Indeterminate expression 0 ComplexInfinity encountered. ≫

Power::infy : Infinite expression $\frac{1}{0.}$ encountered. ≫

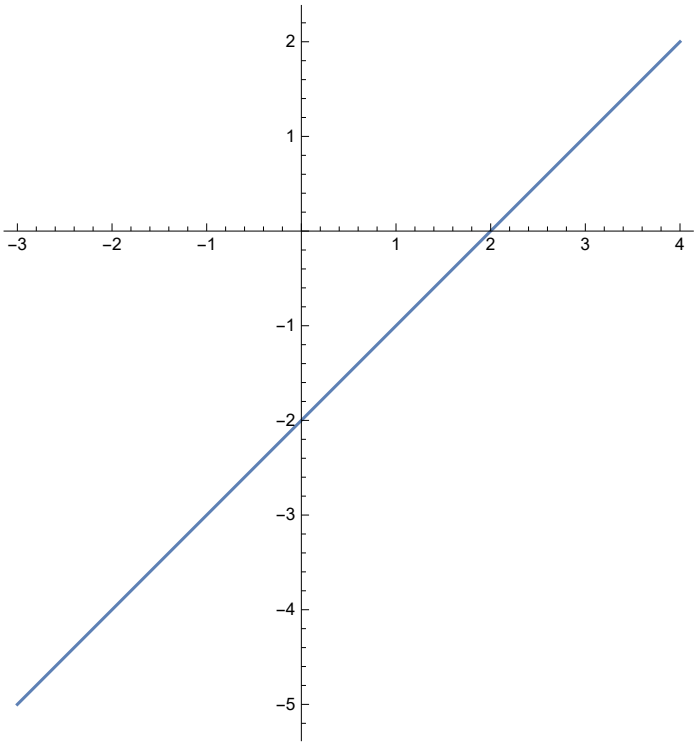
Infinity::indet : Indeterminate expression 0. ComplexInfinity encountered. ≫

Out[312]//TableForm=

2.99999	0.99999
2.99999	0.999991
2.99999	0.999992
2.99999	0.999993
2.99999	0.999994
2.99999	0.999995
3.	0.999996
3.	0.999997
3.	0.999998
3.	0.999999
3.	Indeterminate
3.	1.
3.	1.
3.	1.
3.	1.
3.00001	1.00001
3.00001	1.00001
3.00001	1.00001
3.00001	1.00001
3.00001	1.00001
3.00001	1.00001

In[224]:=
```
Plot[f1[x], {x, -3, 4}, AspectRatio → Automatic]
```

Out[224]=



In[354]:=
```
f2[x_] := Expand[(x - 4) / ((Sqrt[x - 3]) - 1)]
(*el limite cuando x tiende a 3 es igual a 13,
cuando tiene a 4 es igual a 21 y cuando tiende a 5 es igual a 31;
solo en 4 la funcion esta indeterminada*)

Limit[f2[x], x → 3]
```

Out[355]= 1

In[351]:=
```
Limit[f2[x], x → 4]
```

Out[351]= 2

In[350]:=
```
Limit[f2[x], x → 5]
```

Out[350]= $1 + \sqrt{2}$

In[356]:=

```
Limit[f2[x], x → 1];
f2[1];
Limit[f2[x], x → 4];
f2[4];
Limit[f2[x], x → 5];
f2[5];
TableForm[Table[{x, f2[x]}, {x, 3.99999, 4.00001, 0.000001}], {2, 2 / 0.15}]
```

Power::infy : Infinite expression $\frac{1}{0}$ encountered. >>

Infinity::indet : Indeterminate expression 0 ComplexInfinity encountered. >>

Power::infy : Infinite expression $\frac{1}{0.}$ encountered. >>

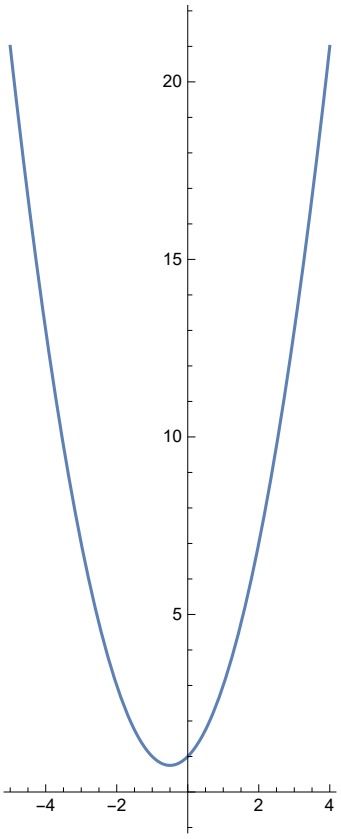
Infinity::indet : Indeterminate expression 0. ComplexInfinity encountered. >>

Out[362]//TableForm=

3.99999	1.99999
3.99999	2.
3.99999	2.
3.99999	2.
3.99999	2.
3.99999	2.
4.	2.
4.	2.
4.	2.
4.	2.
4.	Indeterminate
4.	2.
4.	2.
4.	2.
4.	2.
4.00001	2.
4.00001	2.
4.00001	2.
4.00001	2.
4.00001	2.
4.00001	2.00001

In[364]:=
```
Plot[f[x], {x, -5, 4}, AspectRatio → Automatic]
```

Out[364]=



In[367]:=

```
f3[x_] := Expand[x / Abs[x]]
```

```
Limit[f3[x], x → -1]
```

Out[368]= −1

In[369]:=
```
Limit[f3[x], x → 0]
```

Out[369]= 1

In[370]:=
```
Limit[f3[x], x → 1]
```

Out[370]= 1

In[427]:=
```
Limit[f[x], x → -1];
f[-1];
Limit[f[x], x → 0];
f[0];
Limit[f[x], x → 1];
f[1];
TableForm[Table[{x, f[x]}, {x, -0.00001, 0.00001, 0.00001}], {1, 1/0.0000001}]
```

Power::infy : Infinite expression $\frac{1}{0}$ encountered. >>

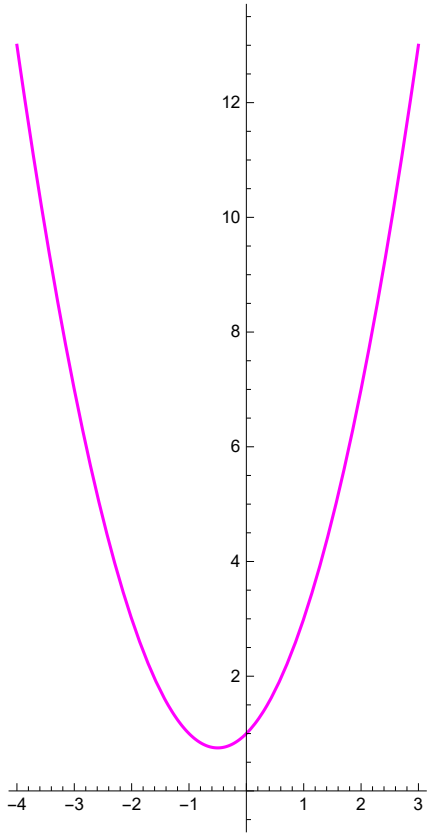
Infinity::indet : Indeterminate expression 0 ComplexInfinity encountered. >>

Out[433]//TableForm=

-0.00001	0.99999
0.	1.
0.00001	1.00001

In[435]:=
```
Plot[f[x], {x, -4, 3}, AspectRatio → Automatic, PlotStyle → Magenta]
```

Out[435]=



In[469]:=

```
f5[x_] := If[x < 2, x - 2, -x^2];

Plot[Piecewise[{{-x^2, x >= 2}, {x - 2, x < 2}}], {x, -2, 5}];

Plot [f5[x], {x, -5, 5}];
f5[2];
f5[0];
Limit[f5[x], x → 2];
f6[x] := Piecewise[{{-x^2, x >= 2}, {x - 2, x < 2}}]
Limit[f6[x], x → 2]
Limit[Piecewise[{{-x^2, x >= 2}, {x - 2, x < 2}}], x → 2, Analytic → True];
Limit[Piecewise[{{-x^2, x >= 2}, {x - 2, x < 2}}], x → 2, Direction → 1];
Limit[Piecewise[{{-x^2, x >= 2}, {x - 2, x < 2}}], x → 2, Direction → -1];
```

Out[476]= -4

In[480]:=

```
Plot[f5[x], {x, -5, 5}, AspectRatio → Automatic]
```

Out[480]=