In [ ]:
```python
import sympy
from sympy import Derivative, Symbol, solve, pprint, sin, Integral, sqrt, Limit,
from sympy.plotting import plot
```
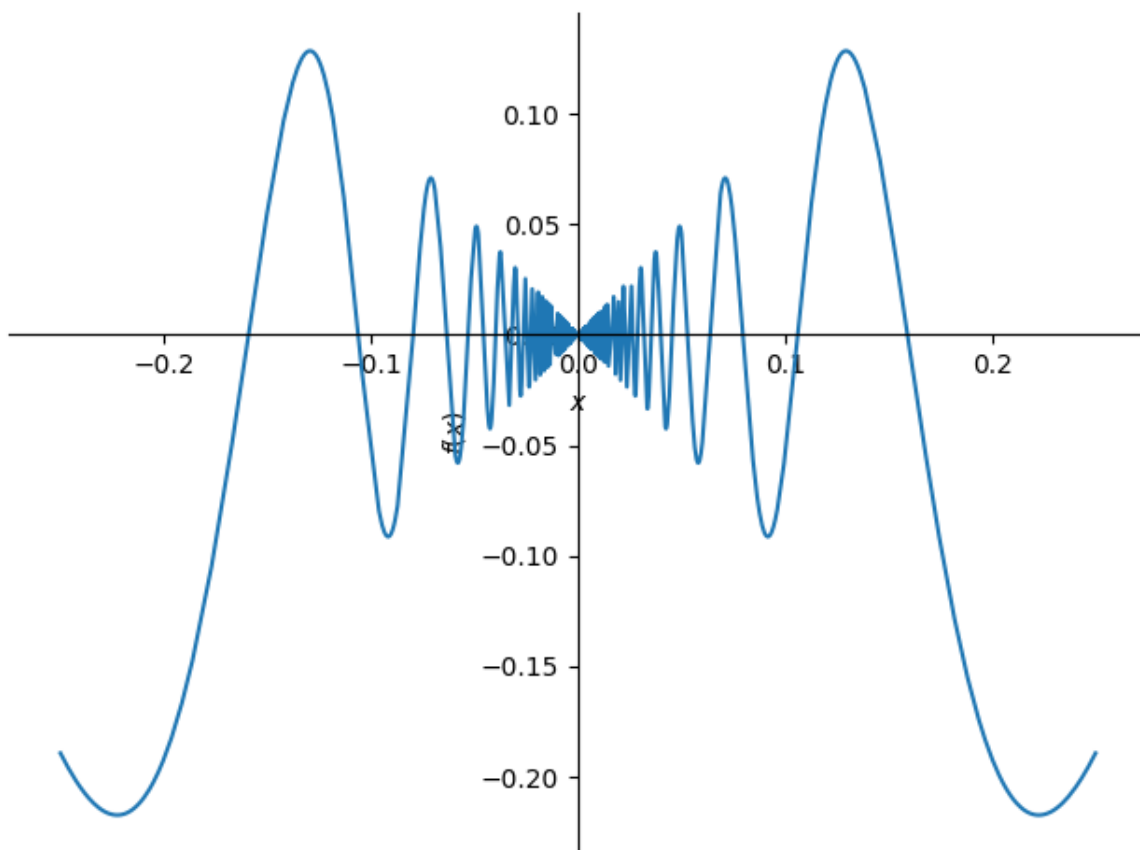
In [ ]:
```python
x = Symbol("x")
c = Symbol("c")
delta = Symbol("delta")
f = x * sin(1/x)
c = 0
delta = 1/4
print(Limit(f, x, 0, dir = '+'))
print(Limit(f, x, 0).doit())
sympy.plot(f, (x, c - delta, c + delta))
```

```
Limit(x*sin(1/x), x, 0)
0
```


Out[ ]:   <sympy.plotting.plot.Plot at 0x1f8e0b70790>

In [ ]:
```python
x = Symbol("x")
f = -x**2 +4*x - 3
d1 = Derivative(f, x).doit()
cuc_tri = solve(d1)
print(cuc_tri)
# print(d1)

A = cuc_tri[0]
d2 = Derivative(d1, x).doit()
d2.subs({x:A}).evalf()
x_min = 0
x_max = 4
print(" Gia tri ham tai cuc tri: ",f.subs({x:A}).evalf())
print("Gia tri ham tai x_min:",f.subs({x:x_min}).evalf())
```

```
print("Gia tri ham tai x_max:",f.subs({x:x_max}).evalf())
print(d2)
plot(f, (x, 0, 4))
```

[2]
 Gia tri ham tai cuc tri: 1.00000000000000
Gia tri ham tai x_min: -3.00000000000000
Gia tri ham tai x_max: -3.00000000000000
-2
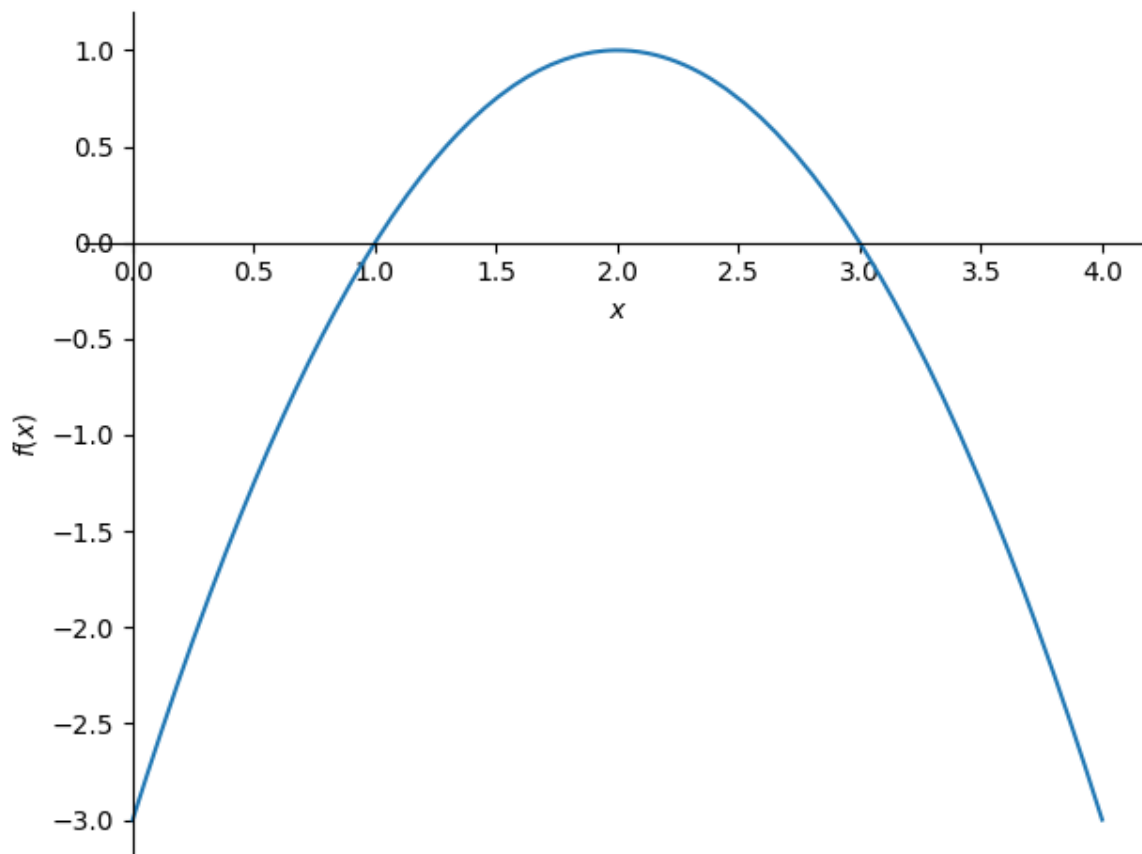
Out[ ]:   <sympy.plotting.plot.Plot at 0x1f8ebb919d0>

```
In [ ]:  x = Symbol("x")
         a = Symbol("a")
         f = -2*x**3 + 2*a*x
         d1 = Derivative(f, x).doit()
         d2 = solve(d1)
         print(f"Cuc tri cua {d1}: {d2}")
         x_1 = f.subs({x:0}).evalf()
         x_2 = f.subs({x:sqrt(a)}).evalf()
         x_3 = f.subs({x:sqrt(a/3)}).evalf()
         print(f"x1 = {x_1}")
         print(f"x2 = {x_2}")
         print(f"x3 = {x_3}")
```

Cuc tri cua 2*a - 6*x**2: [{a: 3*x**2}]
x1 = 0
x2 = 0
x3 = 0.769800358919501*a**1.5

```
In [ ]:  x = Symbol("x")
         f = -10*x**2 + 25000*x - 120000000
         d = Derivative(f,x).doit()
         cuc_tri = solve(d)
         print(cuc_tri)
```

```
A = cuc_tri[0]
Max = f.subs({x:A}).evalf()
print(f"Loi nhuan toi da:", Max)
```

```
[1250]
Loi nhuan toi da: -104375000.000000
```

In [ ]:
```
q = Symbol("q")
f = -0.8*q + 150
print("Dap an:", Integral(f, (q,0,25)).doit().evalf())
#cau 1
d = solve(-0.8*q + 150 - 5.2*q)
print(d)
print("Gia tri la:",f.subs({q:d[0]}).evalf())

#cau 2
tong_tien = Integral(f, (q,0,25)).doit().evalf() - f.subs({q:d[0]}).evalf()
print(f"Tong tien: {tong_tien}")

#cau 3
f1 = 5.2*q
a = 130*25 - Integral(f1, (q,0,25)).doit().evalf()
print("Kq = ",a)
```

```
Dap an: 3500.00000000000
[25.0000000000000]
Gia tri la: 130.000000000000
Tong tien: 3370.00000000000
Kq =  1625.00000000000
```

In [ ]:
```
x = Symbol("x")
f = 2*x**3 - 9*x**2 + 12*x - 4
d = Derivative(f,x).doit()
cuc_tri = solve(d)
print("Gioi han cua ham so:", Limit(f, x, S.Infinity).doit())
print(f"Dao ham cua ham so tren: {d}")
print("Cuc tri cua ham so:", cuc_tri)
plot(f,(x, 1,2))


A = cuc_tri[0]
B = cuc_tri[1]
print(" Gia tri ham tai cuc tri: ",f.subs({x:A}).evalf())
print(" Gia tri ham tai x_min: ",f.subs({x:B}).evalf())


d2 = Derivative(d, x).doit()
print("Dao ham cap 2:", d2)
diem_uong = solve(d2)
print("Diem uon:", diem_uong)
```
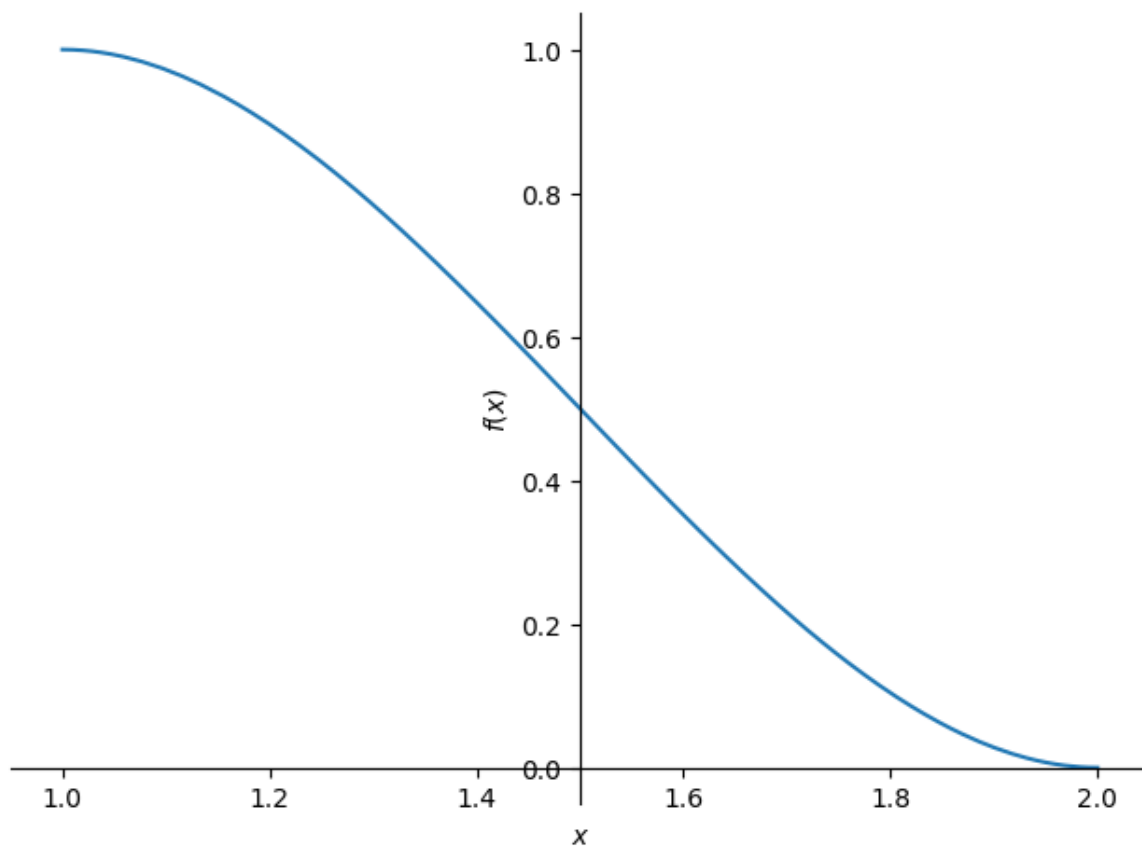
```
Gioi han cua ham so: oo
Dao ham cua ham so tren: 6*x**2 - 18*x + 12
Cuc tri cua ham so: [1, 2]
```

```
 Gia tri ham tai cuc tri:  1.00000000000000
 Gia tri ham tai x_min:  0
Dao ham cap 2: 12*x - 18
Diem uon: [3/2]
```