

Намерете стойностите на параметъра a , при които уравнението

$$\cos x = \frac{x}{a}$$

има два корена.

От: <https://www.matematika.bg/f/viewtopic.php?f=10&t=23016> (<https://www.matematika.bg/f/viewtopic.php?f=10&t=23016>)

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```
In [1]: %matplotlib inline
import sympy as sy

x, a = sy.symbols('x a')
f = sy.cos(x) - x/a
a_left = sy.solve(f,a)[0]
sy.pprint( a_left )

df = sy.diff(f, x)
sy.pprint( df )

eq = df.subs(a,a_left)
sy.pprint(eq)

x_val1 = sy.nsolve(eq,x,3)
sy.pprint(x_val1)

a_val1 = a_left.subs(x,x_val1)
print("a1=",a_val1)
sy.plot(f.subs(a,a_val1))
```

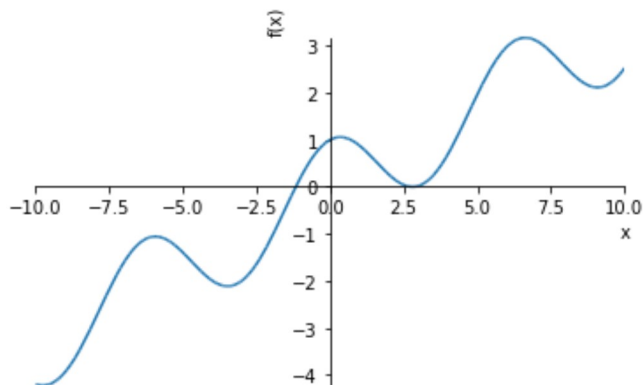
$$\frac{x}{\cos(x)}$$

$$-\sin(x) - \frac{1}{a}$$

$$-\sin(x) - \frac{\cos(x)}{x}$$

2.79838604578389

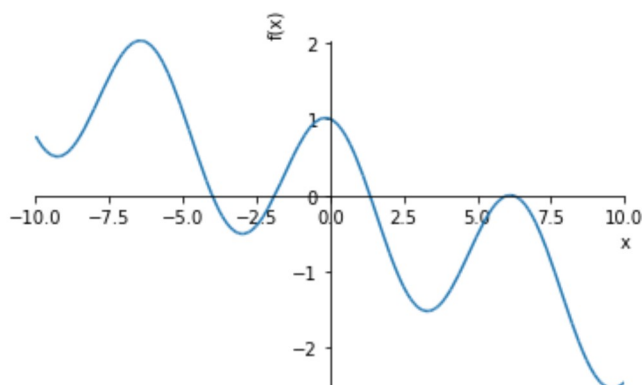
a1= -2.97169387071380



Out[1]: <sympy.plotting.plot.Plot at 0x20fed2ee0b8>

```
In [2]: x_val2 = sy.nsolve(eq,x,6)
sy.pprint(x_val2)
print( x_val2 - x_val1)
a_val2 = a_left.subs(x,x_val2)
print("a2=",a_val2)
print( abs(a_val2) - abs(a_val1))
sy.plot(f.subs(a,a_val2))
```

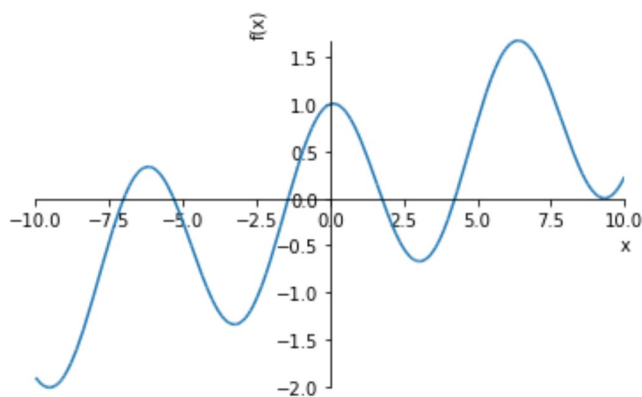
```
6.12125046689807
3.32286442111418
a2= 6.20239528557313
3.23070141485933
```



```
Out[2]: <sympy.plotting.plot.Plot at 0x20fea03d9e8>
```

```
In [3]: x_val3 = sy.nsolve(eq,x,9)
sy.pprint(x_val3)
print( x_val3 - x_val2)
a_val3 = a_left.subs(x,x_val3)
print("a3=",a_val3)
print( abs(a_val3) - abs(a_val2))
sy.plot(f.subs(a,a_val3))
```

```
9.31786646179107
3.19661599489300
a3= -9.37137318645303
3.16897790087989
```



```
Out[3]: <sympy.plotting.plot.Plot at 0x20fed6892b0>
```