

prova 1 - Engenharia Civil

```
In [7]: # Prova da Marli Moro
import numpy as np
def f(x):
    return -14*np.exp(2*x)+15*x+74.04
def biss(a,b):
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<1)
biss(-16,0)
```

-8.0	0	False
-8.0	-4.0	False
-6.0	-4.0	False
-5.0	-4.0	False
-5.0	-4.5	True
-5.0	-4.75	True

```
In [8]: # Prova Paulo Henrik
import numpy as np
def f(x):
    return -14*x**(-3)-7*np.exp(3*x)-0.18
def biss(a,b):
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<0.1)
biss(-102,-1)
```

-51.5	-1	False
-26.25	-1	False
-13.625	-1	False
-7.3125	-1	False
-7.3125	-4.1562	False
-5.7344	-4.1562	False

```
In [10]: # Prova Gabriele Todt
import numpy as np
def f(x):
    return -15*x-9*np.sin(-x)-63.67
def biss(a,b):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<1)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<1)
biss(-10,13)
```

-10	13	False
-10	1.5	False
-4.25	1.5	False
-4.25	-1.375	False
-4.25	-2.8125	False
-4.25	-3.5312	True
-3.8906	-3.5312	True

```
In [11]: # Prova Tiago Venson
import numpy as np
def f(x):
    return -19*x+14*np.sin(-x)+46.13
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-29,48,0.1)
```

-29	48	False
-29	9.5	False
-9.75	9.5	False
-0.125	9.5	False
-0.125	4.6875	False
-0.125	2.2812	False
1.0781	2.2812	False

```
In [12]: # Prova Ketylli
import numpy as np
def f(x):
    return -18*x+5*np.sin(-x)+83.09
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-98,19,10)
```

-98	19	False
-39.5	19	False
-10.25	19	False
4.375	19	False
4.375	11.6875	True
4.375	8.0312	True
4.375	6.2031	True

```
In [13]: # Prova Emily Matos
import numpy as np
def f(x):
    return -8*np.sqrt(x**-1)+17*x-54
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
```

```

else:
    a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(2,55,1)

```

```

2      55      False
2      28.5     False
2      15.25    False
2       8.625   False
2       5.3125  False
2       3.6562  False
2.8281    3.6562    True

```

In [14]: *# Prova Felipe Oliveira*

```

import numpy as np
def f(x):
    return -15*np.sqrt(x**(-3))+4*np.exp(-x)+1.64
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(1,32,0.01)

```

```

1      32      False
1      16.5     False
1       8.75    False
1       4.875   False
2.9375    4.875   False
3.9062    4.875   False
3.9062    4.3906  False

```

In [15]: *# Prova Henrique Vasconcelos*

```

import numpy as np
def f(x):
    return 16*np.sin(-2*x)+18*x+27.1
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-4,22,1)

```

```

-4      22      False
-4       9.0     False
-4       2.5     False
-4      -0.75    False
-2.375   -0.75   False
-1.5625  -0.75   True
-1.5625  -1.1562 True

```

In [16]: *# Prova Daniel Queiroz*

```

import numpy as np
def f(x):
    return 6*np.sin(x)+9*np.log(x**(-2))+19.71
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)

```

```

for i in range(6):
    xm=(a+b)/2
    if f(a)*f(xm)<0:
        b=xm
    else:
        a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(2,12,1)

```

```

2      12      False
2      7.0     False
2      4.5     False
2      3.25    False
2.625   3.25    True
2.9375  3.25    True
2.9375  3.0938  True

```

```

In [17]: # Prova Arthur Bordignon
import numpy as np
def f(x):
    return -11*np.sin(x)-15*x-40.2
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-9,44,0.01)

```

```

-9      44      False
-9      17.5    False
-9      4.25    False
-2.375   4.25    False
-2.375   0.9375  False
-2.375  -0.7188  False
-2.375  -1.5469  False

```

```

In [18]: # Prova Gustavo Felix
import numpy as np
def f(x):
    return -5*x*82-18*np.sin(-2*x)+28.04
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-1,33,1)

```

```

-1      33      False
-1      16.0    False
-1      7.5     False
-1      3.25    False
-1      1.125   False
0.0625  1.125   False
0.0625  0.5938  True

```

```

In [19]: # Prova Bryan Pereira
import numpy as np

```

```
def f(x):
    return -6*np.sin(-2*x)-13*x+43.2
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-39,4,1)
```

-39	4	False
-17.5	4	False
-6.75	4	False
-1.375	4	False
1.3125	4	False
2.6562	4	False
3.3281	4	True

```
In [20]: # Prova Alexandre Polswut
import numpy as np
def f(x):
    return 16*x+12*np.cos(-x)+6.02
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-39,61,0.1)
```

-39	61	False
-39	11.0	False
-14.0	11.0	False
-1.5	11.0	False
-1.5	4.75	False
-1.5	1.625	False
-1.5	0.0625	False

```
In [21]: # Prova Eduarda Vieira
import numpy as np
def f(x):
    return -18*x**3+12*np.cos(3*x)-912.97
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-7,1,0.01)
```

-7	1	False
-7	-3.0	False
-5.0	-3.0	False
-4.0	-3.0	False
-4.0	-3.5	False
-3.75	-3.5	False
-3.75	-3.625	False

```
In [22]: # Prova Angeluz
import numpy as np
def f(x):
    return 17*np.cos(-x)+2*x**2-5.03
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-56,-2,1)
```

-56	-2	False
-29.0	-2	False
-15.5	-2	False
-8.75	-2	False
-5.375	-2	False
-3.6875	-2	False
-3.6875	-2.8438	True

```
In [23]: # Prova Endreu Roberto
import numpy as np
def f(x):
    return -6*x+20*np.exp(-x)+0.72
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-4,111,10)
```

-4	111	False
-4	53.5	False
-4	24.75	False
-4	10.375	False
-4	3.1875	True
-0.4062	3.1875	True
-0.4062	1.3906	True

```
In [24]: # Prova Guilherme Henrique
import numpy as np
def f(x):
    return 10*np.cos(-x)+16*x-56.37
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
```

```

else:
    a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-1,11,1)

```

```

-1      11      False
-1      5.0     False
2.0     5.0     False
3.5     5.0     False
3.5     4.25    True
3.875   4.25    True
3.875   4.0625  True

```

In [25]: *# Prova Lucas Trevisan*

```

import numpy as np
def f(x):
    return -13*x-12*np.sin(2*x)-30.83
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-66,29,0.1)

```

```

-66      29      False
-18.5    29      False
-18.5    5.25    False
-6.625   5.25    False
-6.625   -0.6875 False
-3.6562  -0.6875 False
-3.6562  -2.1719 False

```

In [26]: *# Prova Gabriele Diniz*

```

import numpy as np
def f(x):
    return -6*np.sqrt(x**2)-16*x+85.02
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-21,56,0.1)

```

```

-21      56      False
-21      17.5    False
-1.75    17.5    False
-1.75    7.875   False
3.0625   7.875   False
3.0625   5.4688  False
3.0625   4.2656  False

```

In [27]: *# Prova Joao Custodio*

```

import numpy as np
def f(x):
    return -18*np.sin(x)-19*x+71.96
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)

```

```

for i in range(6):
    xm=(a+b)/2
    if f(a)*f(xm)<0:
        b=xm
    else:
        a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-4,21,1)

```

```

-4      21      False
-4      8.5     False
2.25    8.5     False
2.25    5.375   False
3.8125  5.375   False
4.5938  5.375   True
4.5938  4.9844  True

```

In [28]: *# Prova Isabela Vitoria*

```

import numpy as np
def f(x):
    return -20*x**(-3)+2*x-7.85
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(1,45,1)

```

```

1      45      False
1      23.0     False
1      12.0     False
1      6.5      False
3.75   6.5     False
3.75   5.125   False
3.75   4.4375  True

```

In [29]: *# Prova Fernanda Giacomini*

```

import numpy as np
def f(x):
    return -9*np.sqrt(x**(-2))+20*x-68.47
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
        print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(1,84,10)

```

```

1      84      False
1      42.5     False
1      21.75    False
1      11.375   False
1      6.1875   True
1      3.5938   True
2.2969  3.5938  True

```

In [30]: *# Prova Emelyn Sureck*

```

import numpy as np

```



```
def f(x):
    return -7*np.log(x**2)+2*np.cos(-x)+20.25
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-14,-2,1)
```

```
-14      -2      False
-8.0     -2      False
-5.0     -2      False
-5.0     -3.5    False
-4.25    -3.5    True
-3.875   -3.5    True
-3.875   -3.6875 True
```

In [31]: *# Prova Julia Oliveira*

```
import numpy as np
def f(x):
    return -17*np.sin(x)-18*x+57.66
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(0,17,1)
```

```
0      17      False
0      8.5     False
0      4.25    False
2.125   4.25    False
3.1875   4.25    False
3.1875   3.7188 True
3.4531   3.7188 True
```

In [32]: *# Prova Gabriela Carlone*

```
import numpy as np
def f(x):
    return 9*x+8*x-6.99
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
biss(-89,14,10)
```

-89	14	False
-37.5	14	False
-11.75	14	False
-11.75	1.125	False
-5.3125	1.125	True
-2.0938	1.125	True
-0.4844	1.125	True

```
In [34]: # Prova Tainara Maria
import numpy as np
def f(x):
    return -17*x+7*np.sin(x)-12.33
def bise(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
bise(-84,10,10)
```

-84	10	False
-37.0	10	False
-13.5	10	False
-1.75	10	False
-1.75	4.125	True
-1.75	1.1875	True
-1.75	-0.2812	True

```
In [35]: # Prova Luigi Antonio
import numpy as np
def f(x):
    return 12*np.sqrt(x)+10*np.exp(-3*x)-25.52
def bise(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
bise(0,25,1)
```

0	25	False
0	12.5	False
0	6.25	False
3.125	6.25	False
3.125	4.6875	False
3.9062	4.6875	True
4.2969	4.6875	True

```
In [36]: # Prova Cristiane Santana
import numpy as np
def f(x):
    return 20*x+3*np.sin(-2*x)+79.71
def bise(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
```

```

else:
    a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(-7,92,0.1)

```

```

-7      92      False
-7     42.5     False
-7     17.75    False
-7      5.375   False
-7     -0.8125  False
-7     -3.9062  False
-5.4531   -3.9062  False

```

In [37]: *# Prova Guilherme Dias*

```

import numpy as np
def f(x):
    return x**3-6*np.cos(-2*x)-5.39
def biss(a,b,limi):
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    for i in range(6):
        xm=(a+b)/2
        if f(a)*f(xm)<0:
            b=xm
        else:
            a=xm
    print(np.round(a,4), ' ', np.round(b,4), ' ', np.abs(a-b)<limi)
    biss(0,10,1)

```

```

0      10      False
0      5.0     False
0      2.5     False
0      1.25    False
0.625   1.25    True
0.9375  1.25    True
1.0938  1.25    True

```

Questão 3

In [45]: *# prova Guilherme Dias*

```

import numpy as np
def f(x):
    return 13*np.log(x**-2)-14*np.sin(-x)+36.96
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=b #np.round(b,4)
        b=xm # np.round(xm,4)
    print(np.round(b,4), ' ', np.abs(a-b)<lim or f(xm)<lim)
    seca(3,4,0.01)

```

```

3
4
3.5173  True
3.4692  False
3.4747  True
3.4747  True
3.4747  True

```

In [46]: *# prova Luigi Antonio*

```

import numpy as np
def f(x):

```

```

    return 3*x**2+14*x**3-641.5
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim or f(xm)<lim)
seca(3,4,0.001)

```

```

3
4
3.4388    True
3.4995    True
3.5086    False
3.5084    True
3.5084    True

```

```

In [48]: # prova Tainara
import numpy as np
def f(x):
    return 3*np.sqrt(1/x**2)-8*np.exp(-x)-0.56
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim or f(xm)<lim)
seca(2,3,0.001)

```

```

2
3
2.7738    False
2.5175    True
2.6151    False
2.6032    True
2.6023    True

```

```

In [50]: # prova Gabriela Carlone
import numpy as np
def f(x):
    return 2*x-13*(1/x**3)+1.92
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim or f(xm)<lim)
seca(1,2,0.1)

```

```

1
2
1.6789    False
1.2183    True
1.4616    False
1.4145    True
1.4005    True

```

```

In [54]: # prova Julia Oliveira
import numpy as np

```

```
def f(x):
    return 15*np.exp(3*x)-4*np.sin(-3*x)-384.35
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=b
        b=xm
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.001)
```

```
1
2
1.0144    True
1.0263    True
1.0875    False
1.081     True
1.0815    True
```

In [52]: *# prova Emelyn Sureck*

```
import numpy as np
def f(x):
    return 2*x**3-19*np.exp(x)+2081.13
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(4,5,0.001)
```

```
4
5
4.7057    False
4.7876    False
4.7975    True
4.7971    True
4.7971    True
```

In [55]: *# prova Fernanda Giacomini*

```
import numpy as np
def f(x):
    return -13*np.sin(-x)-8*np.sqrt(1/x**3)-6.85
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.001)
```

```
2
3
2.2463    False False
2.339     False False
2.3761    False True
2.3727    False True
2.3728    True True
```

In [56]: *# prova Joao Custodio*

```

import numpy as np
def f(x):
    return 11*x-4*np.exp(2*x)+11267.91
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(3,4,0.001)

```

```

3
4
3.9406   False False
3.9728   False False
3.9737   True  True
3.9736   True  False
3.9736   True  True

```

```

In [57]: # prova Gabriele Diniz
import numpy as np
def f(x):
    return 8*x**3+12*np.exp(-x)-283.68
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(3,4,0.001)

```

```

3
4
3.2269   False True
3.2727   False True
3.2838   False False
3.2836   True  True
3.2836   True  True

```

```

In [58]: # prova Lucas Trevisan
import numpy as np
def f(x):
    return 5*np.exp(2*x)+13*np.log(x)-291.87
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.001)

```

```

2
3
2.0056   False True
2.0094   False True
2.0177   False False
2.0176   True  True
2.0176   True  True

```

```
In [59]: # prova Guilherme Henrique
import numpy as np
def f(x):
    return -12*x**3+6*np.cos(3*x)+967.51
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(4,5,0.001)

4
5
4.2758  False False
4.3204  False False
4.3283  False True
4.3282  True True
4.3282  True True
```

```
In [60]: # prova Endreu
import numpy as np
def f(x):
    return 18*np.sqrt(x**3)+20*np.exp(2*x)-272.96
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.01)

1
2
1.1097  False True
1.1741  False True
1.2707  False False
1.2569  False True
1.258   True True
```

```
In [62]: # prova Angeluz
import numpy as np
def f(x):
    return 8*(1/x**3)+12*(1/x**2)-4.93
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.001)

1
2
1.9419  False True
1.8033  False False
1.8254  False True
1.8233  False True
1.8232  True True
```

```
In [63]: # prova Eduarda Vieira
import numpy as np
def f(x):
    return 14*np.log(1/x)-10*np.exp(2*x)+171.74
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.01)
```

1
2
1.2031 False False
1.308 False False
1.4288 False True
1.4055 False False
1.4075 True False

```
In [64]: # prova Alexandre
import numpy as np
def f(x):
    return np.exp(2*x)+3*x-113.05
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.01)
```

2
3
2.1491 False True
2.2337 False True
2.3514 False False
2.33 False True
2.3319 True True

```
In [65]: # prova Bryan
import numpy as np
def f(x):
    return -7*x+16*np.exp(x)-977.54
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(4,5,0.001)
```



```

4
5
4.0883    False True
4.1218    False True
4.1422    False False
4.1417    True True
4.1417    True True

```

```

In [66]: # prova Gustavo Felix
import numpy as np
def f(x):
    return -11*x**3-4*np.exp(3*x)+1477.31
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
    seca(1,2,0.001)

```

```

1
2
1.8607    False False
1.945     False False
1.9525    False True
1.9516    True False
1.9516    True True

```

```

In [67]: # prova Arthue Bordignon
import numpy as np
def f(x):
    return 2*np.sqrt(x**2)-16*np.exp(x)+928.25
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
    seca(4,5,0.001)

```

```

4
5
4.0418    False False
4.0585    False False
4.0696    False True
4.0694    True True
4.0694    True True

```

```

In [68]: # prova Daniel Braga
import numpy as np
def f(x):
    return 12*(1/x)-19*np.log(x)-10.1
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)

```

```
print(np.round(b,4),' ',np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.001)
```

```
1
2
1.0991    False True
1.0451    False False
1.0644    False True
1.064     True True
1.064     True True
```

In [69]: *# prova Henrique Vasconcelos*

```
import numpy as np
def f(x):
    return -15*x**3+20*np.cos(-3*x)+1376.84
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4),' ',np.abs(a-b)<lim , f(xm)<lim)
    seca(4,5,0.001)
```

```
4
5
4.458     False False
4.5162     False False
4.5228     False True
4.5227     True True
4.5227     True True
```

In [70]: *# prova Rafael Dias*

```
import numpy as np
def f(x):
    return -11*x**3+12*np.sin(2*x)+66.38
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4),' ',np.abs(a-b)<lim , f(xm)<lim)
    seca(1,2,0.001)
```

```
1
2
1.6835     False False
1.7682     False False
1.7761     False True
1.7758     True True
1.7758     True True
```

In [71]: *# prova Felipe Oliveira*

```
import numpy as np
def f(x):
    return 7*x**3-14*np.exp(-2*x)-66.69
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
```

```

    b=np.round(xm,4)
    print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.001)

```

```

2
3
2.0822    False True
2.1093    False True
2.1223    False False
2.1221    True True
2.1221    True True

```

```

In [72]: # prova Emily
import numpy as np
def f(x):
    return 19*(1/x**2)-3*np.log(x)-12.92
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(1,2,0.01)

```

```

1
2
1.3723    False True
1.0055    False False
1.2284    False True
1.1974    False True
1.1886    True True

```

```

In [73]: # prova Ketylli
import numpy as np
def f(x):
    return 15*np.exp(x)-13*(1/x**3)-235.69
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.001)

```

```

2
3
2.6602    False True
2.7457    False True
2.7577    False False
2.7571    True True
2.7571    True True

```

```

In [74]: # prova Tiago Venson
import numpy as np
def f(x):
    return -15*np.cos(x)-2*(1/x)-12.46
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))

```

```

a=np.round(b,4)
b=np.round(xm,4)
print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(2,3,0.001)

```

```

2
3
2.8073    False False
2.5426    False True
2.665     False False
2.6502    False False
2.6488    False True

```

In [75]: *# prova Gabriela Todt*

```

import numpy as np
def f(x):
    return 12*np.cos(-2*x)+8*x**2-166.24
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
    seca(4,5,0.001)

```

```

4
5
4.6279    False True
4.7102    False True
4.7206    False False
4.7201    True True
4.7202    True True

```

In [76]: *# prova Isabela*

```

import numpy as np
def f(x):
    return 2*x**2-np.sin(-3*x)-2.64
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
    seca(1,2,0.01)

```

```

1
2
1.0894    False True
1.1547    False True
1.3398    False False
1.2688    False True
1.2809    False True

```

In [77]: *# prova Paulo Henrik*

```

import numpy as np
def f(x):
    return 2*np.cos(-x)-6*(1/x)+3.77
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):

```

```

xm=b-(((b-a)*f(b))/(f(b)-f(a)))
a=np.round(b,4)
b=np.round(xm,4)
print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
seca(3,4,0.001)

```

```

3
4
3.1791    False True
3.2673    False True
3.3356    False False
3.3255    False True
3.3261    True True

```

```

In [78]: # prova MarLi Moro
import numpy as np
def f(x):
    return -15*np.sin(3*x)-3*np.exp(x)+108.91
def seca(a,b,lim):
    print(np.round(a,4))
    print(np.round(b,4))
    for i in range(5):
        xm=b-(((b-a)*f(b))/(f(b)-f(a)))
        a=np.round(b,4)
        b=np.round(xm,4)
        print(np.round(b,4), ' ', np.abs(a-b)<lim , f(xm)<lim)
    seca(3,4,0.01)

```

```

3
4
3.4756    False False
3.6562    False False
3.7395    False True
3.7181    False False
3.7193    True True

```

In []: