

# BESSEL FUNCTION

```
import math
import matplotlib.pyplot as plt
import numpy as np

def bessel(n, x):

    j = 0
    for r in range(21):
        d = (math.factorial(r) * math.gamma(n + r + 1))

        j = j + (((-1)**r) * ((x / 2)**(n + 2*r))) / d

    return j

N = [0, 1, 2, 3]

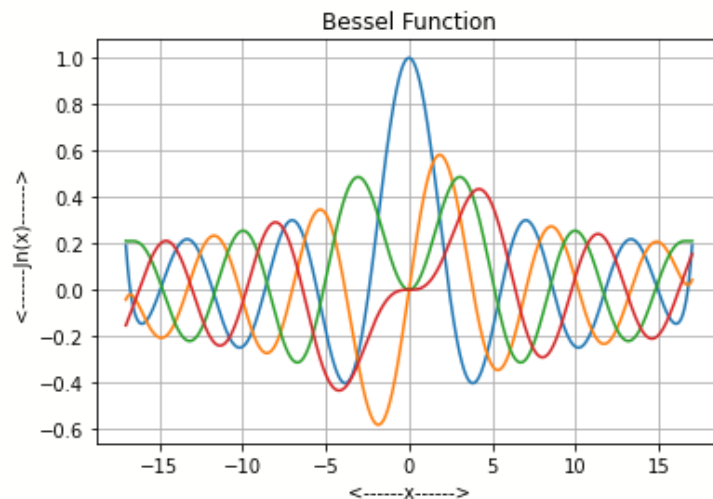
X = np.linspace(-17, 17, 5000)

for a in range(len(N)):
    J = []
    for i in range(len(X)):
        J.append(bessel(a, X[i]))

    plt.plot(X, J)

plt.grid(True)
plt.xlabel('<-----x----->')
plt.ylabel('<-----Jn(x) ----->')
plt.title('Bessel Function')
plt.show()
plt.clf()
```

OUTPUT –



```

# Using in-built bessel function

from scipy.special import jv

x = np.linspace(-20, 20, 1000)

for i in range(0, 3):
    J = jv(i, x)
    plt.plot(x, J)

plt.title('In-Built BESSEL FUNCTION', fontweight = 'bold')
plt.xlabel('x', fontweight = 'bold', fontsize = 16)
plt.ylabel('Jn(x)', fontweight = 'bold', fontsize = 16)
plt.grid()
plt.show()

```

OUTPUT –

