PYTHON CODE:

```
import numpy as np
import matplotlib.pyplot as plt
resolution = 0.0001
x = np.arange(-np.pi,np.pi,resolution)# -pi to pi with the interval of 0.0001
square = np.array(x)
square[range(x.size)] = 0
square[range(int(x.size/2))] = 1
square[range(int(x.size/2), int(x.size))]= 0
np.trapz(square,x) # integration of f(x)
a0 = (np.trapz(square,x))/ np.pi # dividing by pi which is present out side the integration

n=1
harm = np.sin(n*x)
mult1 = square*harm
fund = np.trapz(mult1,x)
np.trapz(mult1,x)
b1 = (np.trapz(mult1,x))/np.pi

n=3
harm = np.sin(n*x)
mult2 = square*harm
third = np.trapz(mult2,x)
np.trapz(mult2,x)
b3 = (np.trapz(mult2,x))/np.pi


20*np.log10(abs(third/fund))

plt.subplot(311)
plt.plot(x,square)
plt.xlabel('(x)')
plt.ylabel('f(x)')
plt.title('SIGNAL', fontsize=18)

plt.subplot(312)
plt.plot(x,mult1)
plt.plot(x,square)
plt.xlabel('(x)')
plt.ylabel('sin(1*x)*f(x)')
```

```
plt.subplot(313)
plt.plot(x,mult2)
plt.plot(x,square)
plt.xlabel('(x)')
plt.ylabel('sin(3*x)*f(x)')
plt.show()
```

Output:

>>> a0
0.99998642294279794 (~1)

>>> b1

-0.63661977194539721 $\left(-\frac{2}{\pi}\right)$

>>> b3

-0.21220658952264121 $\left(-\frac{2}{3\pi}\right)$

$$f(x) = \frac{a_0}{2} - \frac{2}{\pi}\left(sinex + \frac{1}{3}sine3x + ...\right)$$

Output Waveform: