

# 11-12\_FFT\_Example

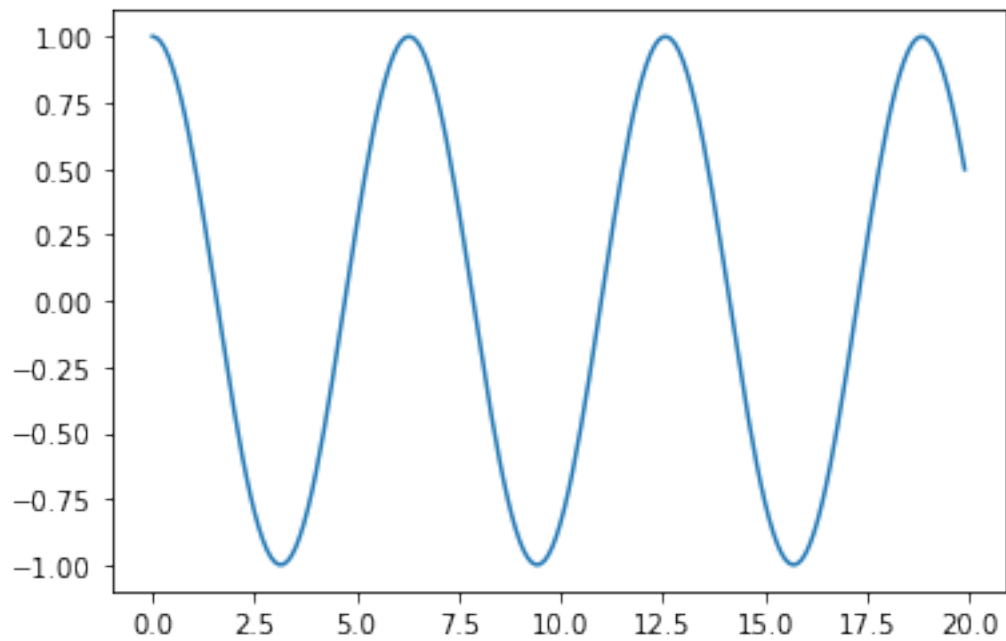
September 27, 2023

```
[1]: import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

```
[2]: dt = 0.1
t = np.arange(0, 20, dt)
x = np.cos(t)
```

```
[3]: plt.plot(t, x)
```

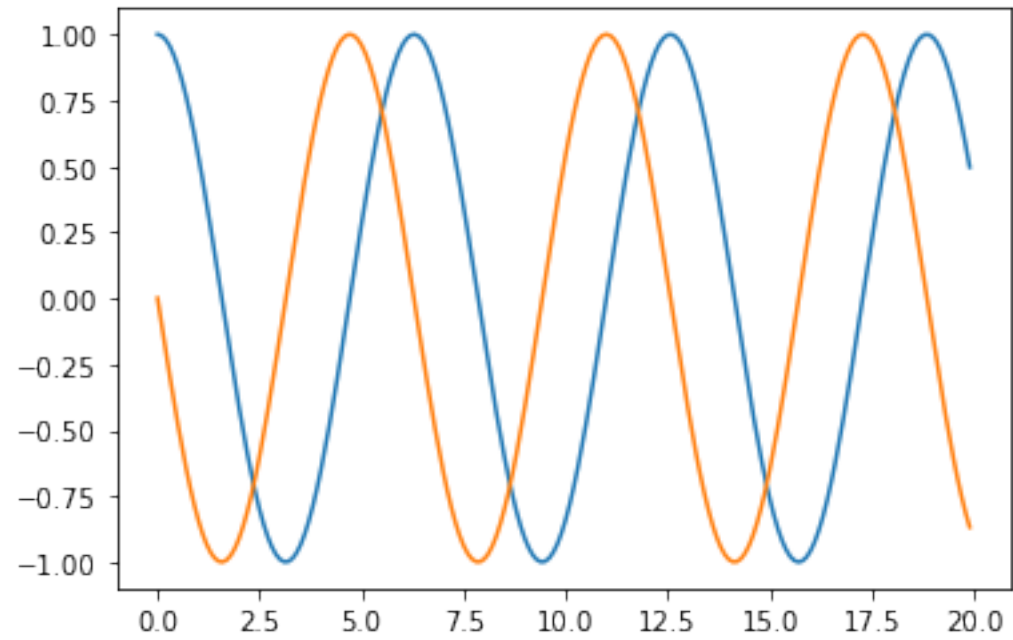
```
[3]: [<matplotlib.lines.Line2D at 0x7f1db71dd190>]
```



```
[4]: x_prime = -np.sin(t)
```

```
[5]: plt.plot(t, x)
plt.plot(t, x_prime)
```

[5]: [`<matplotlib.lines.Line2D at 0x7f1db7152370>`]

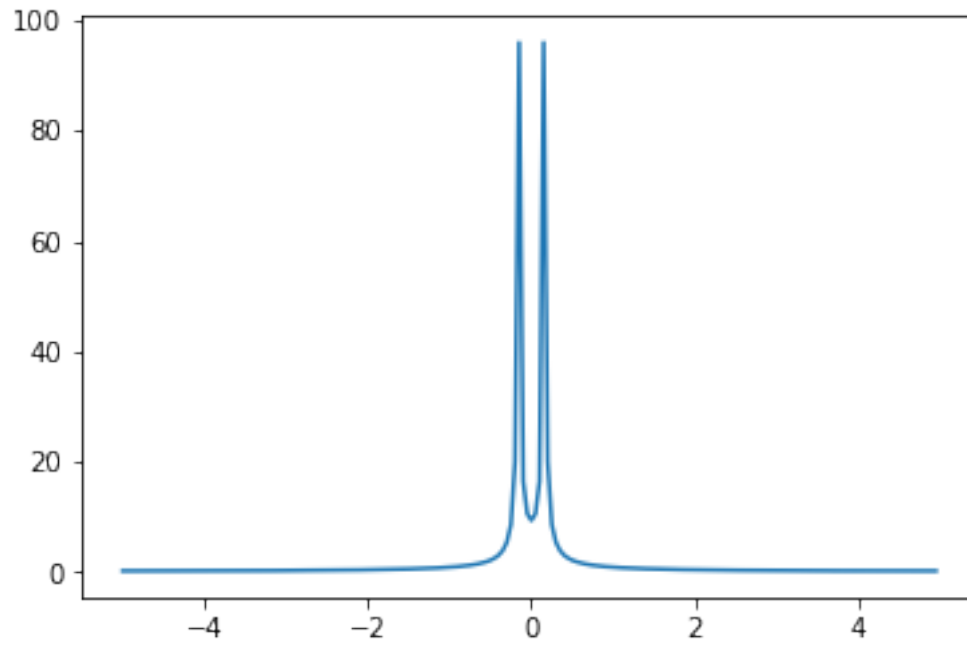


```
[6]: F = np.fft.fft(x)
```

```
[7]: omega = np.fft.fftfreq(F.size, d=dt)
```

```
[8]: order = omega.argsort()  
plt.plot(omega[order], np.abs(F[order]))
```

[8]: [`<matplotlib.lines.Line2D at 0x7f1db70ee280>`]

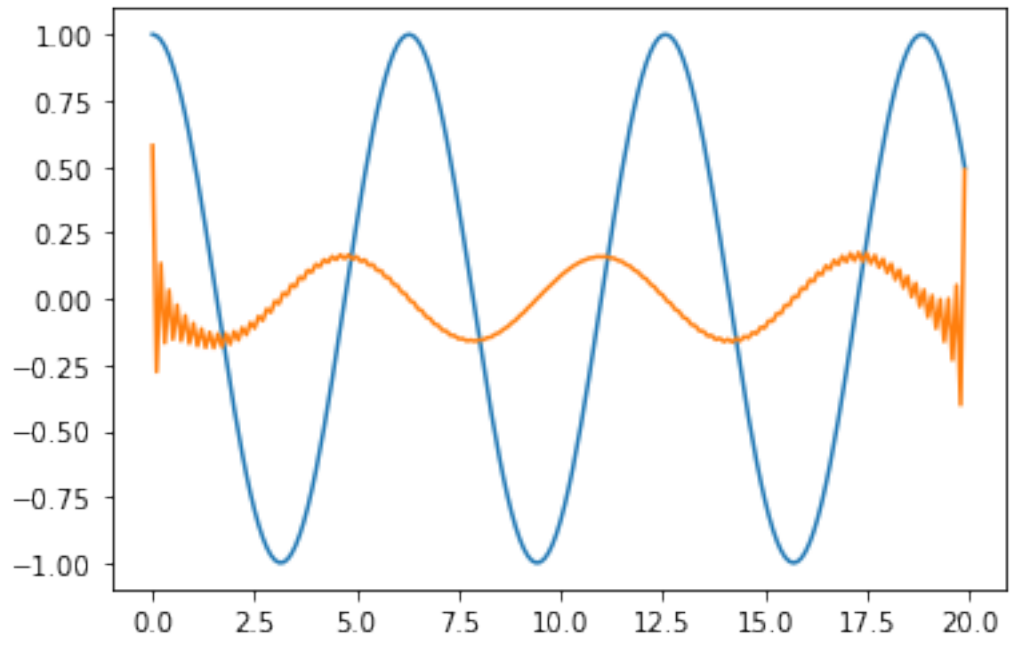


```
[9]: F_prime = 1j * omega * F
```

```
[13]: x_prime_fft = np.fft.ifft(F_prime)
```

```
[14]: plt.plot(t, x)  
plt.plot(t, x_prime_fft)
```

```
[14]: [<matplotlib.lines.Line2D at 0x7f1db710f6a0>]
```



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