

# CTFT Octave Codes (3A)

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Based on  
M.J. Roberts, Fundamentals of Signals and Systems

# Normalized $\omega_s$ and $\omega_0$

```
NF = 32;  
Ts = 2/NF;  
fs = 1/Ts;  
fF = fs/NF;  
n = [0:NF-1]';  
t = n*Ts;  
x = t.*(1-t).*rect((t-1/2));  
X = Ts*fft(x);  
  
k = [0:NF/2-1];
```

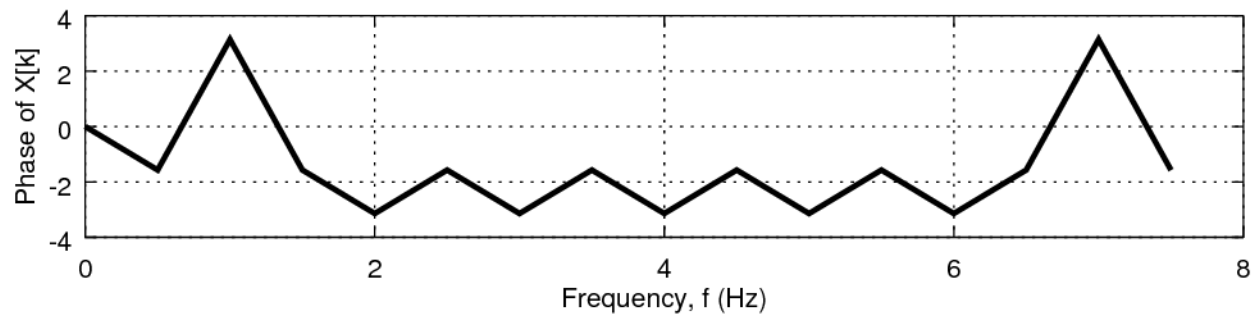
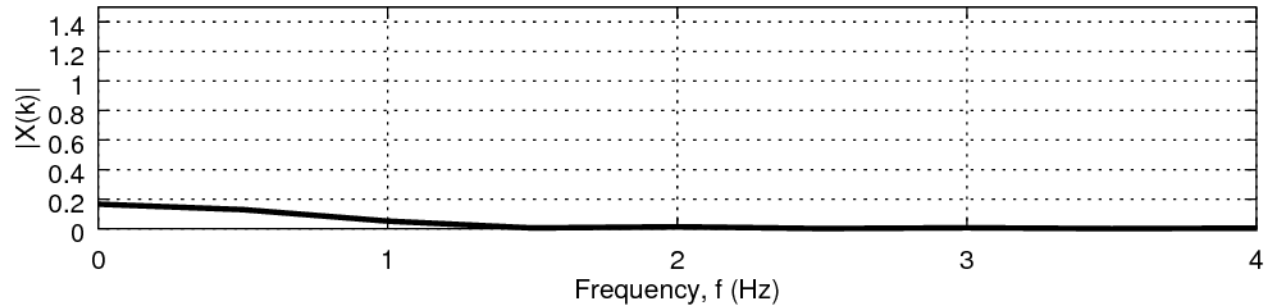
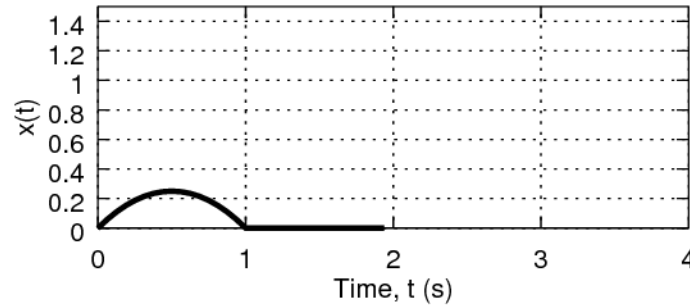
# Normalized $\omega_s$ and $\omega_0$

```
subplot(3,1,1);  
p = plot(t,x,'k'); grid on;  
set(p, 'LineWidth',2);  
axis('equal'); axis([0,4,0,1.5]);  
xlabel('Time, t (s)');  
ylabel('x(t)');
```

```
subplot(3,1,2);  
p = plot(k*fF,abs(X(1:NF/2)),'k');  
set(p,'LineWidth',2); grid on;  
axis([0,4,0,1.5]);  
xlabel('Frequency, f (Hz)');  
ylabel('|X(k)|');
```

```
subplot(3,1,3);  
p = plot(k*fF,angle(X(1:NF/2)),'k');  
set(p,'LineWidth',2); grid on;  
xlabel('Frequency, f (Hz)');  
ylabel('Phase of X[k]');
```

# Normalized $\omega_s$ and $\omega_0$



# Normalized $\omega_s$ and $\omega_0$

```
NF = 32;  
Ts = 2/NF;  
fs = 1/Ts;  
fF = fs/NF;  
n = [0:NF-1]';  
t = n*Ts;  
x = t.*(1-t).*rect((t-1/2));  
X = fftshift(Ts*fft(x));  
  
K = [-NF/2:NF/2-1];
```

# Normalized $\omega_s$ and $\omega_0$

```
subplot(3,1,1);  
p = plot(t,x,'k'); grid on;  
set(p, 'LineWidth',2);  
axis('equal'); axis([0,4,0,1.5]);  
xlabel('Time, t (s)');  
ylabel('x(t)');
```

```
subplot(3,1,2);  
p = plot(k*fF,abs(X),'k');  
set(p,'LineWidth',2); grid on;  
axis([0,4,0,1.5]);  
xlabel('Frequency, f (Hz)');  
ylabel('|X(f)|');
```

```
subplot(3,1,3);  
p = plot(k*fF,angle(X),'k');  
set(p,'LineWidth',2); grid on;  
xlabel('Frequency, f (Hz)');  
ylabel('Phase of X(f)');
```



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## References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] M.J. Roberts, Fundamentals of Signals and Systems
- [4] S.J. Orfanidis, Introduction to Signal Processing
- [5] K. Shin, et al., Fundamentals of Signal Processing for Sound and Vibration Engineerings
  
- [6] A “graphical interpretation” of the DFT and FFT, by Steve Mann