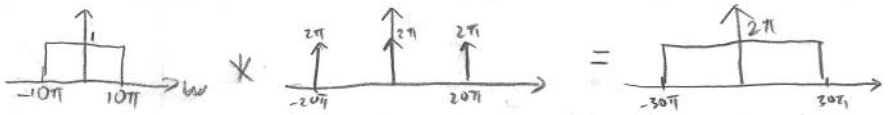
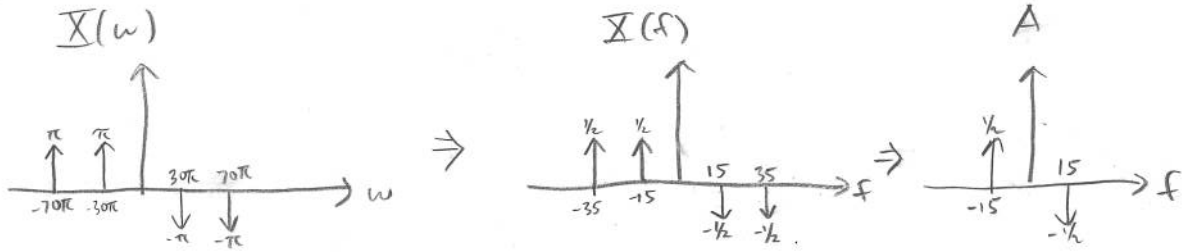
5.54 $\frac{\sin(10\pi t)}{\pi t}\left[1+2\cos(20\pi t)\right] = \text{rect}\left(\frac{w}{20\pi}\right) * 2\pi\delta(w) + 2\pi\left[\delta(w-20\pi)+\delta(w+20\pi)\right]$



$= 2\pi\,\text{rect}\left(\frac{w}{15\pi}\right)$

$= \frac{\sin(30\pi t)}{\pi t}$

6.64 $x(t) = \sin(30\pi t) + \sin(70\pi t)$



7.1 (a) $\{\underline{1}, 1, 1\}$

(b) $\{\underline{0}, 1, 2, 3, 4\}$

(c) $\{\underline{1}, 1, 1, 1, 1\}$

(d) $\{\underline{0}, 2, -4\}$

7.2 (a) $\{\underline{1}, 1, 1, 1\}$

(b) $\{\underline{1}, 1, -1, -1\}$

(c) $\{\underline{0}, 1, 2, 1\}$

(d) $\{\underline{0}, 1, 0, -1\}$

7.4 (a) $N_0 = \frac{2\pi}{0.075\pi} = \boxed{\frac{80}{3}}$ $\Omega_0 = \frac{2\pi}{\frac{80}{3}} = \boxed{\frac{3\pi}{40}}$

(b) $N_0 = \frac{2\pi}{0.56\pi} = \boxed{\frac{25}{7}}$ $\Omega_0 = \frac{2\pi}{\frac{25}{7}} = \boxed{\frac{14\pi}{25}}$

(c) Not periodic

7.5 (a) linear, not time invariant

(b) not linear, time invariant

(c) linear, not time invariant

(d) linear, time invariant

7.7 $\{\underline{1}, 2, 3\} \rightarrow$ [Linear] $\rightarrow \{\underline{1}, 4, 7, 6\}$ $\quad \delta[n] \rightarrow$ [Linear] $\rightarrow \{\underline{1}, 3\}$

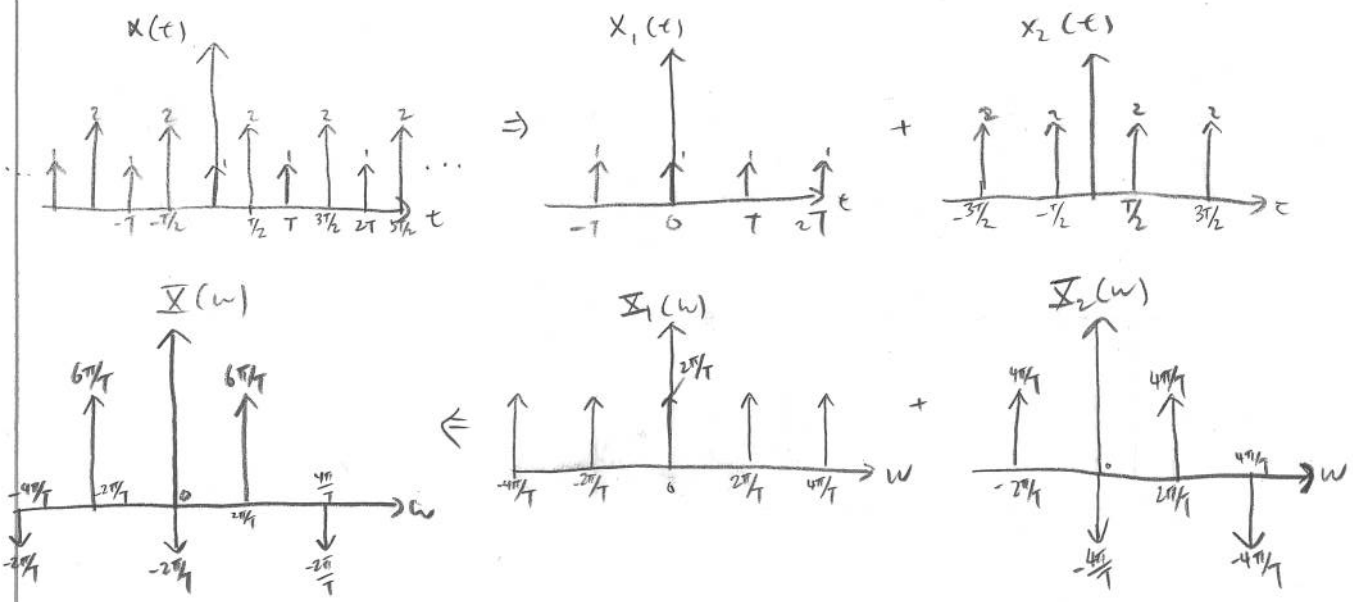
$h[n] = \{\underline{1}, 3\}$ $\quad x[n] = \{\underline{1}, 2, 3\}$ If the system was LTI,

$h[n] * x[n]$ shouldn't =

$\underset{3}{\underset{\underline{1}}{1}} \quad \underset{}{2} \quad \underset{}{3}$

$= \{\underline{1}, 2+3, 3+6, 9\} = \{\underline{1}, 5, 9, 9\}$ which is not the case. Since we know that the system is linear, it must mean that it is not time invariant.

7.5 $\sum_{n=-\infty}^{\infty} [\delta(t-nT) + 2\delta(t-nT-\frac{T}{2})]$



Editor - J:\ECEn 380\Homework\HW8\myconv_t.m

myconv_t.m | h_t.m

```
1   function [y] = myconv_t(x,h)
2
3   m = length(x);
4   n = length(h);
5   X=[x,zeros(1,n)];
6   H=[h,zeros(1,m)];
7   for i=1:n+m-1
8       y(i)=0;
9       for j=1:m
10          if(i-j+1>0)
11              y(i)=y(i)+X(j)*H(i-j+1);
12          else
13          end
14      end
15  end
16
17  end
18
19
```

Command Window

New to MATLAB? See resources for Getting Started.

```
a =

     1     3     5    -2     0    -3     5


b =

    -1     1     0     0    -2     1

>> d = myconv_t(a,b)

d =

    -1    -2    -2     7    -4    -2   -15    14    -2     6   -13     5

>>
```