정보통신 수학 및 실습
Lab assignment

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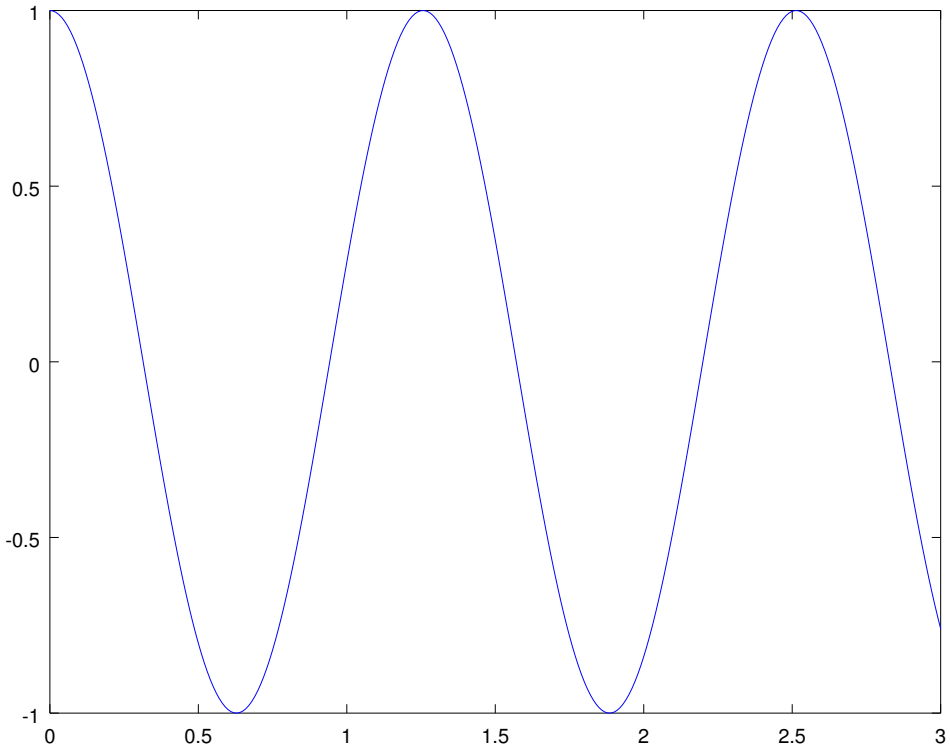
Chapter 3. Lab Assignment

1. Plot the following cosine functions using MATLAB and write down their frequencies. You must define the boundaries and the intervals of variable t properly to obtain at least one cycle of the function. [Hint: use t such that $wt > 2\pi \times n$, where n is the number of cycles in the plot.]

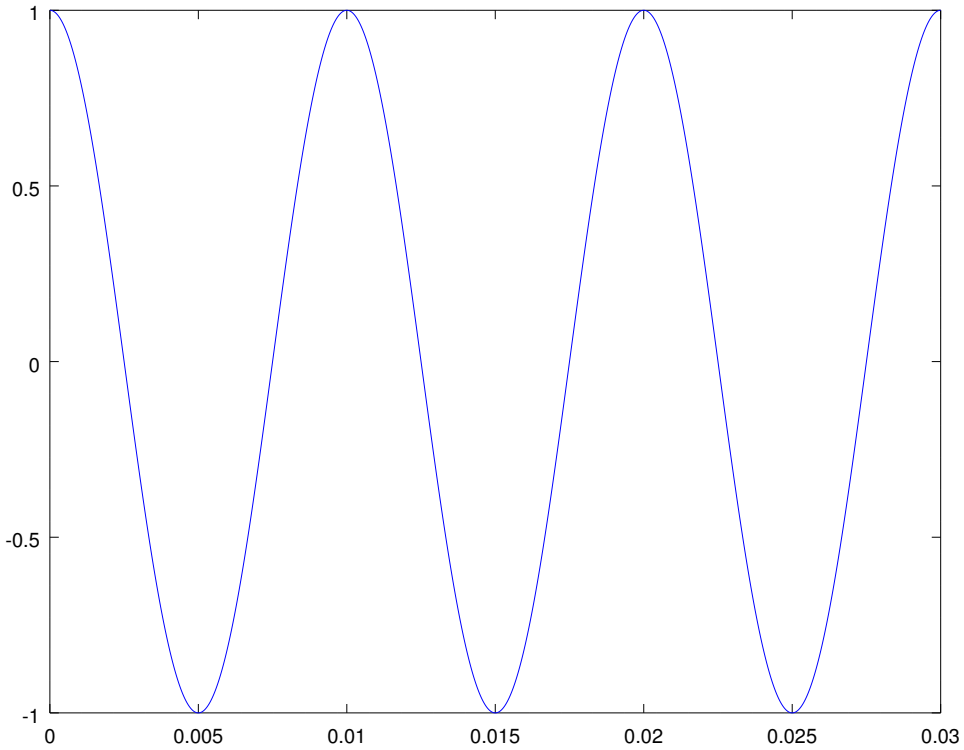
a) $\cos(5t)$

$2\pi f = 5$
$\therefore f = \dfrac{5}{2\pi}$



b) $\cos(2\pi 100t)$

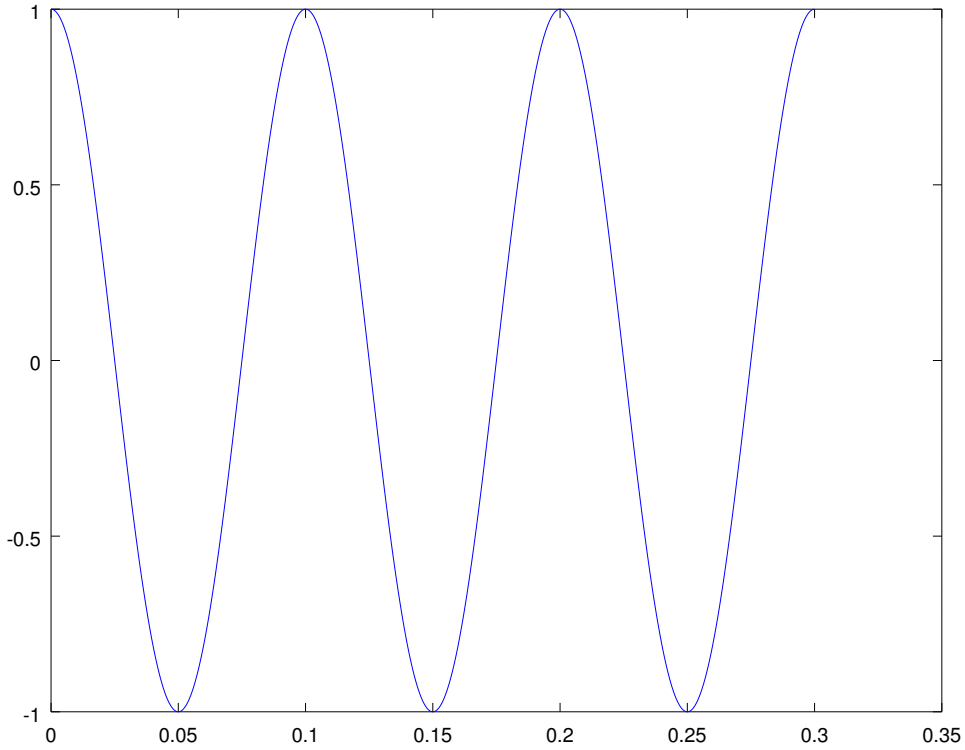
$2\pi f = 2\pi 100$
$\therefore f = 100$



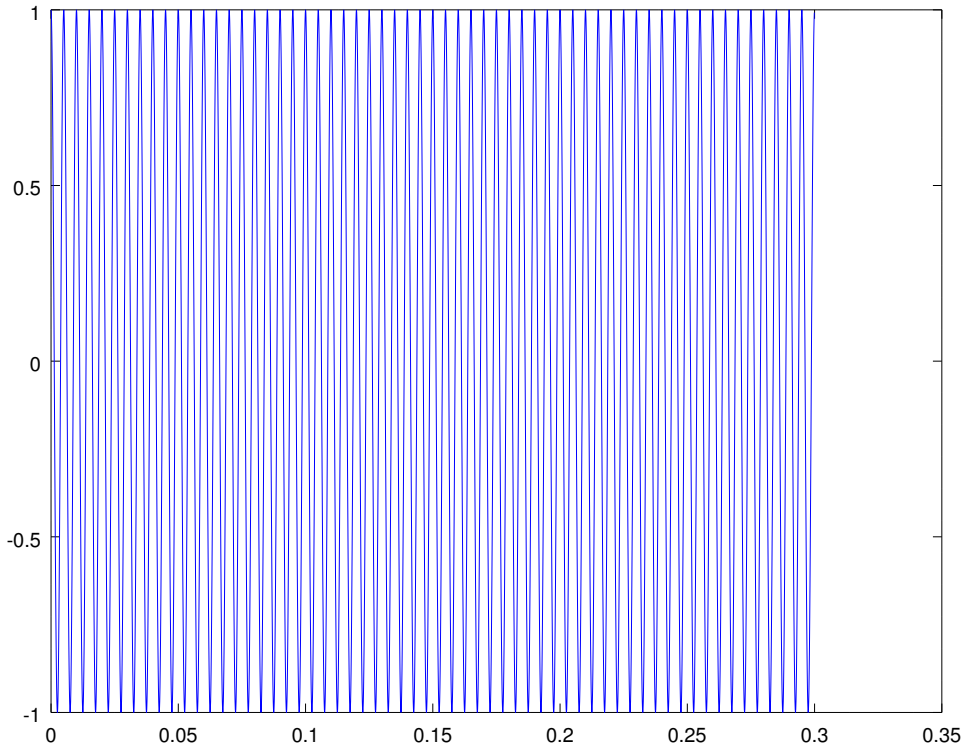
2. If the sound signal is defined as $m(t) = \cos(2\pi(10)t)$ and the carrier signals is $\cos(2\pi(300)t)$, answer the following questions: (Hint: use t=[0:0.0001:1])

```
>> t = [0:0.0001:1];
>> ct = cos(2*pi*200*t);
>> mt = cos(2*pi*10*t);
>> plot(t(1:3000),mt(1:3000))
>> print -depsc 2a.eps
>> plot(t(1:3000), ct (1:3000) )
>> print -depsc 2b.eps
>> xc = mt.*ct;
>> plot(t(1:3000),xc (1:3000) )
```

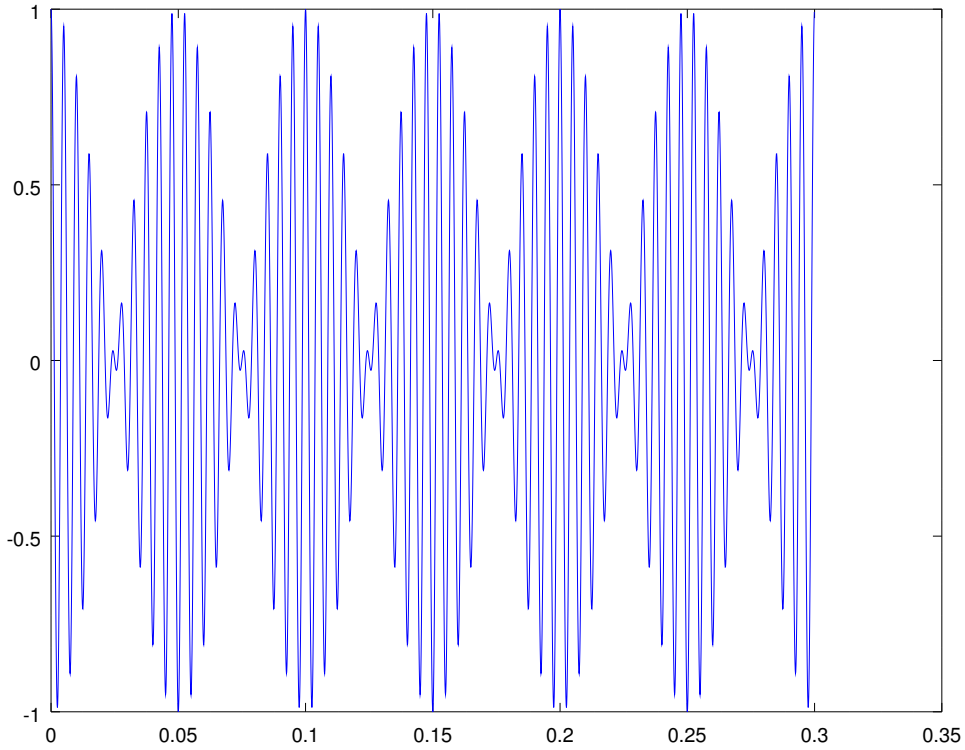
a) Plot mt(1:3000)



b) Plot ct(1:3000)



c) Plot xc = mt * ct for xc(1:3000)

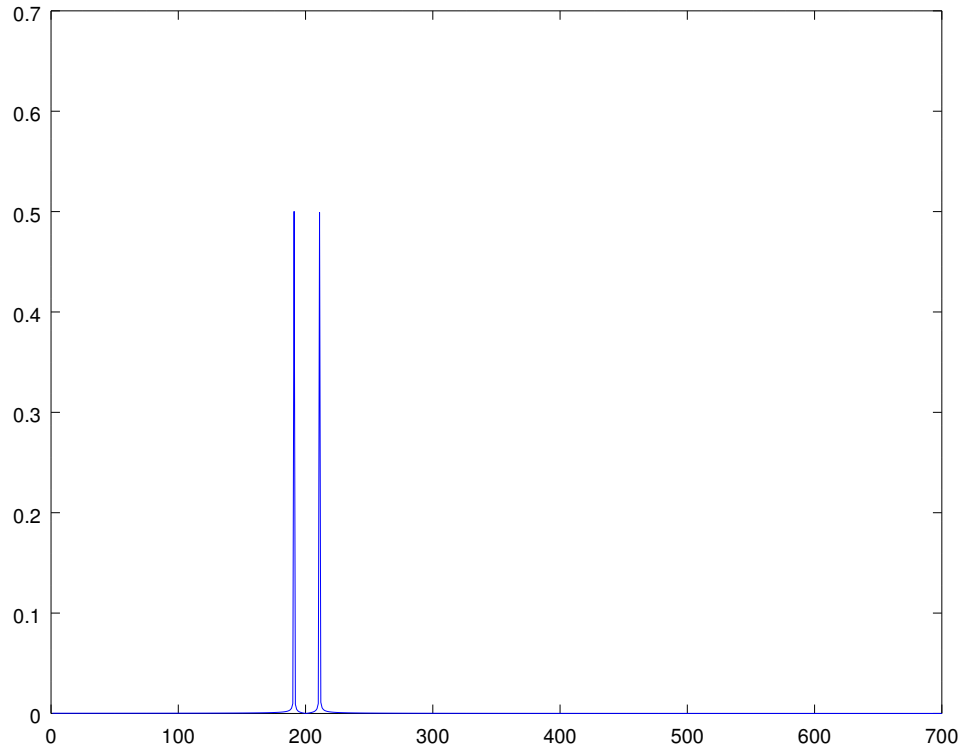


d) Plot the spectrum of signal xc using the following commands:

spec=abs(fft(xc));

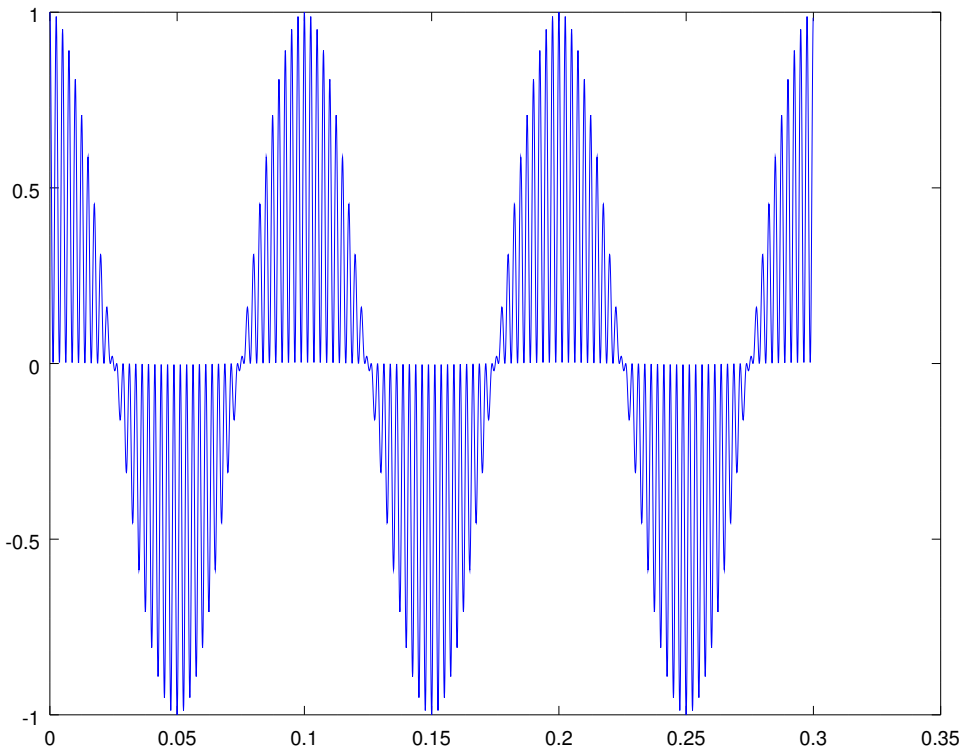
N=length(spec)/2;

plot(spec(1:700)/N)



e) Plot xi=xc*ct for xi(1:3000).

```
>> xi = xc  .*  ct ;
>> plot(t (1:3000) ,  xi (1:3000) )
```

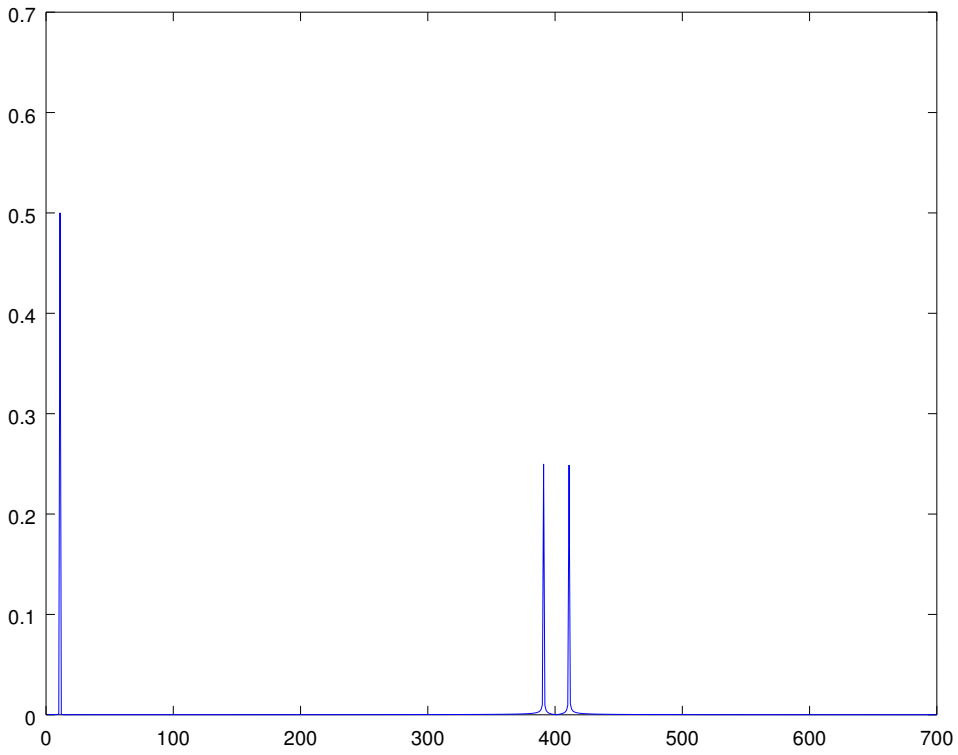


f) Plot the spectrum of signal xi using the following commands:

spec2=abs(fft(xi));

N=length(spec2)/2;

plot(spec2(1:700)/N)



g) What must be the cutoff frequency of LPF to recover mt from xi?

10보다 커야 한다.