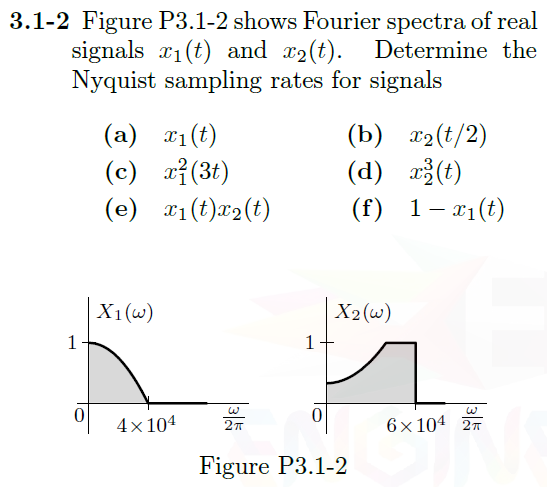
3.1-2(c,d,e)



c)





This will cause max frequency in Fourier spectra to shrink from 40,000Hz to 13,333Hz

Multiplication in time domain leads to convolution in frequency domain. According to width property:



So, Max Frequency in Fourier spectra will be 13,333Hz + 13,333Hz = 26,666Hz

Nyquist’s says that:

So,

d)   
As in problem c, this is equivalent to:



Multiplication in time-domain leads to convolution in the frequency domain.

According to width property:



So, new Fourier spectra max = (60,000Hz + 60,000Hz) + 60,000Hz = 180,000Hz

Nyquist’s says that:

So,

e)



Multiplication in time-domain leads to convolution in the frequency domain.

According to width property:

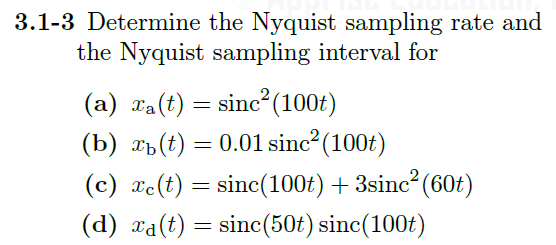


So, new Fourier spectra max = 40,000Hz + 60,000Hz = 100,000Hz

Nyquist’s says that:

So,

3.1-3(a,c)

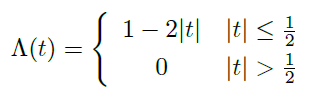


a) We know the Transform Pair for this function is:





Where, and the Unit Triangle function is described as:



Then we can easily see that will be zero when

Nyquist’s says that:

So,

And,

c) Let’s say that:

We know the Transform Pairs for these two added functions are:







Then we can see that:

Nyquist’s says that:

So,

And,