2.1 c)

The property observed is time scaling property.

If FT{x(t)}=X(w);

Then FT{x(at)}=1/|a| *X(w/a).

If |a|>1 we find that the signal is compressed and when |a|<1, signal is stretched.

2.1 d)

We expect delta functions in the fourier transform of the outputs but we find certain deviation.

This is because of the fact that we are integrating only from –pi to pi rather than from minus infinity to plus infinity. Since we cannot integrate over the entire real line there is a deviation.

2.1 e)

We know that the convolution of two rectangular signals gives triangle signal. Also the convolution in time is multiplication in frequency domain. So we expect the fourier transform to be the product of the fourier transform of the rectangular signals which is the square of sinc function.

2.2 a)

We know that a periodic signal can be written in the form x=sigma (ak*e^jkw0t).

Now we need to find the frequency response of this system. We know that the output of the LTI system with input e^jkw0t is H(kw0)*e^jkw0t

By using this property we find that the output has fourier coefficients ak*H(kw0). Also the output is periodic and with period w0.