6.1)

b) Yes. We observed that all the DTFT plots are periodic with period 2pi.

c) For positive values the graph directly decreases from 1 ->a->….. and eventually 0.

For negative values same thing repeats but there are oscillations from positive to negative and negative to positive

If we increase from 0.1 to 0.9, the decrease is very steep for small values and for large values the decrease is less steep.

Also regarding the magnitudes, as a and b increase, the region in which the plot is minimum increases and steeply increases towards the max value at certain points.

6.2)

b) The inverse DTFT of rectangular pulse is sinc. The graph compresses(ie oscillations increase) as we change from pi/8 to pi/2.

At wc=pi, the X(ejw) is 1. So its inverse DTFT is delta function(ie 1 at n=0, 0 otherwise)

6.3)

c) The response in a) acts as band pass filter as the graph is |sinw|

The first part in b) acts as a low pass filter as the graph is |1-2cosw|

The second part in b) acts as high pass filter as the graph is sin^2(w/2)

d) If a is positive, we get a low pass filter as low frequencies are allowed and high frequencies are attenuated. If negative we get a high pass filter as high frequencies are allowed and low frequencies are attenuated.

If b increases, the width of the pulse decreases and so the cutoff frequency decreases.