(1) A finite length (N=4) signal consists of the sequence: x[n] = {1 0 2 -1}. Determine the DFT sequence X[k] for k=0, 1, 2, 3.

(2) What is the relationship between the length 4 DFT of the sequence {1 2 3 1} and the length 8 DFT of the sequence {1 2 3 1 0 0 0 0}? Explain.

(3) An IIR difference equation is given: y[n] = 0.5 y[n-1] + x[n]

Assuming initial rest, what is the functional form for the output signal y[n] if the input signal is a unit step? Use the inverse z-transform method.