(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.