(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.