Assignment 3

1. Write a code for correlation of two given DTSs without using inbuilt function.

   Convolution output $y(n)$ is given by

   $$y(n) = x(n) * h(-n) = \sum_{n=-\infty}^{\infty} x(k)h(n-k)$$

   Given data:

   Discrete time sequences 1 (DTS1): $X_1(n_1) = \{1\ 2\ 3\ 4\}, n_1 = -1{:}\,2$

   Discrete time sequences 2 (DTS2): $X_2(n_2) = \{1\ 2\ 1\ 1\}, n_1 = -2{:}\,1 = h(n)$

2. Write a code for distance measurement in radar using correlation.

   Steps:

   a) Consider 13-point Barker sequence
      X (n) = {+1, +1, +1, +1, +1,-1 -1, +1, +1 -1, +1 -1, +1}
   b) Take V (n) be a Gaussian random sequence with zero mean and variance σ^2=0.01.
   c) Generate a sequence Y(n), Where Y(n) = a X(n-D) + V(n)
   d) Take Delay =20 , a =0.9
   e) Plot the signals X (n), Y (n).
   f) Compute and plot the cross correlation result
   g) Use the plot to estimate the delay value, D.
   h) Calculate the distance using the formula
      R= (c*delay)/2
      Where, c=3 x 10e8 m/s
      R is the distance