Q4

Part a:

Given: Two sequences <1,0,0,0,0,…,0,1> with K+2 length

Aim: Produce the multiplication of two K+2

So that, P(A) = $(x^{k+1}+1)$, P(B) = $(x^{k+1}+1)$,. P(A)*P(B) = $(x^{2(k+1)}+2x^{k+1}+1)$, Apply DFT form to the P(A)*P(B) then the result will become <1,0,0,0,…,2,0,0,…,1>. The length of final equation is 2k+3, the first coefficient and the last coefficient are both 1. What's more the (k+2)th coefficient is 2.

Part b:

Given: <1,0,0,0,0,…,0,1> with K+2 length

Aim: Show the equation of DFT

Known <A> = <1,0,0,0,0,…,0,1>, use IDFT form transfer to equation P(A) = $(x^{k+1}+1)$. Apply the FFT form to P(A), in DFT method we will divide the circle into k+2 part. So the DFT form is $< P(1), P(w_{k+2}^{1}), P(w_{k+2}^{2}), P(w_{k+2}^{3}),..., P(w_{k+2}^{k+1}) >$.

Take the sequence value of $< P(1), P(w_{k+2}^{1}), P(w_{k+2}^{2}), P(w_{k+2}^{3}),..., P(w_{k+2}^{k+1}) >$ to function P(A) = $(x^{k+1}+1)$ calculate the result Which is

$< 2, 1+w_{k+2}^{1(k+1)}, 1+w_{k+2}^{2(k+1)}, 1+w_{k+2}^{3(k+1)},..., 1+w_{k+2}^{(k+1)(k+1)} >$.