**Question 4**

**a)**

We have the sequence

Equate this to a suitable polynomial,

To calculate the convolution of , we compute the two sequences multiplied, i.e. .

However, we must compute the number of which we ignored in our initial multiplication.

These zeroes exist in between and and in between and , i.e. the coefficients for up to , and to .

We know that two sequences of ’s type with and elements, produce a sequence of length .

Using the fact that the polynomial has elements, we can use the point above to calculate the number of elements in .

Since has 3 non-zero coefficients, subtract this from the total amount of elements to find the number of ’s.

There are many coefficients in the convolution, so our solution is

**b)**

Our sequence is

We can form the corresponding polynomial,

And extend it to

Now, we evaluate the above for its complex roots of unity, i.e.

We know that , so