Problem 2

The even samples of the Discrete Fourier Transformation (DFT) of a 9-point real signal x[n] are given by

$X[0] = 3.1$
$X[2] = 2.5 + j4.6$
$X[4] = -1.7 + j5.2$
$X[6] = 9.3 + j6.3$
$X[8] = 5.5 - j8.0$

Determine the missing odd samples of the DFT. Use the properties of the DFT to solve this problem.

Solution:

The DFT of a real sequence is conjugate symmetric. Therefore, as x[n] is real, we have $X[-k] = X^*[k]$

It follows that

$X[1] = X^*[9-1] = X^*[8] = 5.5 + j8.0$
$X[3] = X^*[9-3] = X^*[6] = 9.3 - j6.3$
$X[5] = X^*[9-5] = X^*[4] = -1.7 - j5.2$
$X[7] = X^*[9-7] = X^*[2] = 2.5 - j4.6$