DFT $x(n) = \{4, 3, 2, 6, 8, 4, 6, 3\}$

$$X(K) = \sum_{n=0}^{N-1} x(n) W_N^{nK} \qquad N = 8.$$

$$\therefore X(K) = \sum_{n=0}^{7} x(n) W_8^{nK}.$$

Using direct calculation method.

$W_8^0 = 1$ $\quad W_8^1 = 0.707 - 0.707j$ $\quad W_8^2 = -j$ $\quad W_8^3 = -0.707 - 0.707j$

$W_8^4 = -1$ $\quad W_8^5 = -0.707 + 0.707j$ $\quad W_8^6 = j$ $\quad W_8^7 = 0.707 + 0.707j$.

$X(0) = 4+3+2+6+8+4+6+3 = 36$

$X(1) = 4+3W_8^1+2W_8^2+6W_8^3+8W_8^4+4W_8^5+6W_8^6+3W_8^7 = -6.82+2.58j$

$X(2) = 4+3W_8^2+2W_8^4+6W_8^6+8W_8^8+4W_8^{10}+6W_8^{12}+3W_8^{14} = 4+2j$.

$X(3) = 4+3W_8^3+2W_8^6+6W_8^9+8W_8^{12}+4W_8^{15}+6W_8^{18}+3W_8^{21} = -1.17-5.41j$.

$X(4) = 4+3W_8^4+2W_8^8+6W_8^{12}+8W_8^{16}+4W_8^{20}+6W_8^{24}+3W_8^{28} = 4$.

$X(5) = 4+3W_8^5+2W_8^{10}+6W_8^{15}+8W_8^{20}+4W_8^{25}+6W_8^{30}+3W_8^{35} = -1.17+5.41j$.

$X(6) = 4-2j$ (Conjugate of $X(2)$). (Conjugate symmetry property)

$X(7) = -6.82+2.58j$.

Same in matlab.

IDFT using DFT.

$$X(K) = \sum_{n=0}^{N-1} x(n) W_8^{Kn} \qquad N = 8.$$

Now $$x(n) = \left\{ \sum_{K=0}^{N-1} X^*(K) W_N^{Kn} \right\}^*$$

$X(K) = \{36, -6.82 + 2.85j, 4 + 2j, -1.17 + 5.41j, 4, -1.17 + 5.41j,$

$4 - 2j, -6.82 - 2.58j\}$

$X^*(K) = \{36, -6.82 - 2.85j, 4 - 2j, -1.17 - 5.41j, 4, -1.17 - 5.41j,$

$4 + 2j, -6.82 + 2.58j\}$

$x(0) = 36 - 6.82 - 2.85j + 4 - 2j - 1.17 - 5.41j + 4 - 1.17 - 5.41j + 4 + 2j$

$-6.82 + 2.58j = 4.$

$x(1) = 36 + (-6.82 + 2.85j) W_8^1 + (4 + 2j) W_8^2 + (-1.17 + 5.41j) W_8^3 + 4 W_8^4$

$+ (-1.17 + 5.41j) W_8^5 + (4 - 2j) W_8^6 + (-6.82 - 2.58) W_8^7 = 3.$

$x(2) = 2$ $\qquad$ $x(5) = 4$

$x(3) = 6$ $\qquad$ $x(6) = 6.$

$x(4) = 8$ $\qquad$ $x(7) = 8.3$

$x(n) = \{4, 3, 2, 6, 8, 4, 6, 3\}$