Manually compute (show work) the IDFT of the DFT points X_k where $X_0 = 5$, $X_1 = 1 + j2$, $X_2 = -15$, and $X_3 = 1 - j2$. Plot input $x[n]$ with each of the stems labeled.

Use (4.40), $x[n] = \frac{1}{N}\sum_{k=0}^{N-1} X_k e^{j2\pi kn/N}, \quad n = 0, 1, \dots N-1$ **with $N = 4$.**

$$x[n] = \frac{1}{4}\sum_{k=0}^{3} X_k e^{j2\pi kn/4} = \frac{1}{4}\left[X_0 + X_1 e^{j2\pi(1)n/4} + X_2 e^{j2\pi(2)n/4} + X_3 e^{j2\pi(3)n/4}\right]$$

$$= \frac{1}{4}\left[3 + (4 + j1)e^{j\pi n/2} - 7e^{j\pi n} + (4 - j1)e^{j3\pi n/2}\right], \quad n = 0, 1, 2, 3$$

$$n = 0:\ \ x[0] = \frac{1}{4}\left[5 + (1 + j2)e^{0} - 15e^{0} + (1 - j2)e^{0}\right] \quad \Rightarrow \quad \underline{x[0] = -2}$$

$$n = 1:\ \ x[1] = \frac{1}{4}\left[3 + (1 + j2)e^{j\pi(1)/2} - 15e^{j\pi(1)} + (1 - j2)e^{j3\pi(1)/2}\right] \quad \Rightarrow \quad \underline{x[1] = 4}$$

$$n = 2:\ \ x[2] = \frac{1}{4}\left[5 + (1 + j2)e^{j\pi(2)/2} - 15e^{j\pi(2)} + (1 - j2)e^{j3\pi(2)/2}\right] \quad \Rightarrow \quad \underline{x[2] = -3}$$

$$n = 3:\ \ x[3] = \frac{1}{4}\left[5 + (1 + j2)e^{j\pi(3)/2} - 15e^{j\pi(3)} + (1 - j2)e^{j3\pi(3)/2}\right] \quad \Rightarrow \quad \underline{x[3] = 6}$$