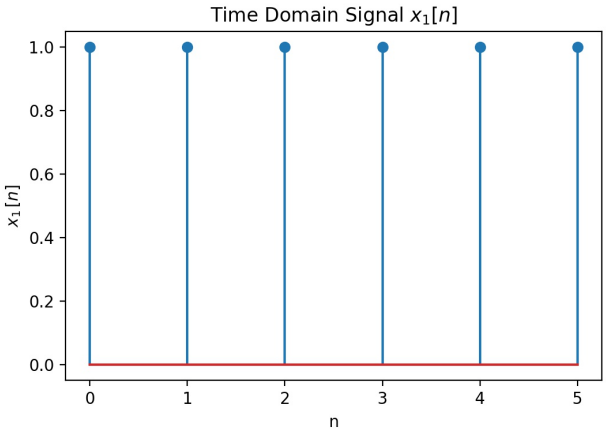
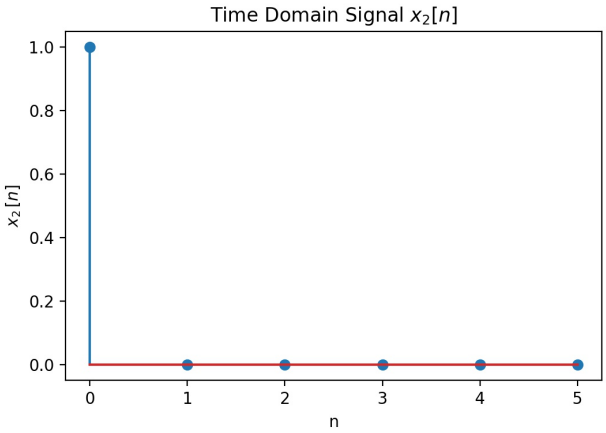
1 DFT

Consider the following length 6 signals. Compute its DFT coefficients $X[k]$. Then plot its magnitude $|X[k]|$ and phase $\angle X[k]$.

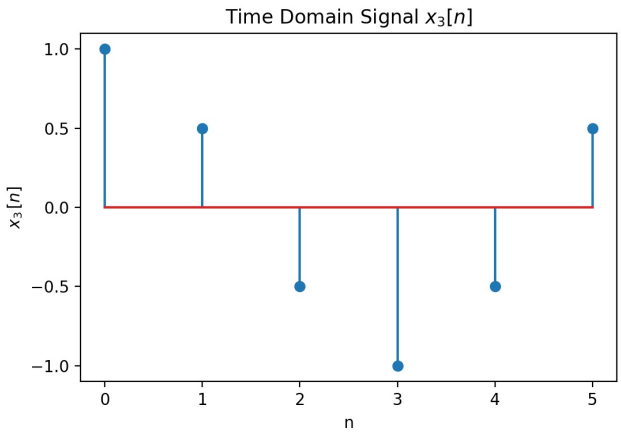
a) $x_1[n] = u[n] = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 \end{bmatrix}$.



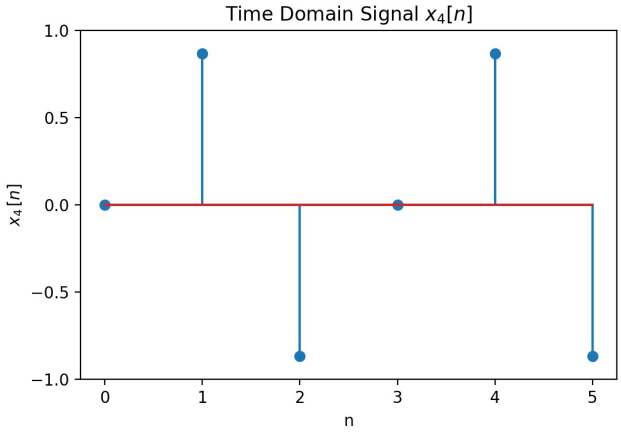
b) $x_2[n] = \delta[n] = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$.



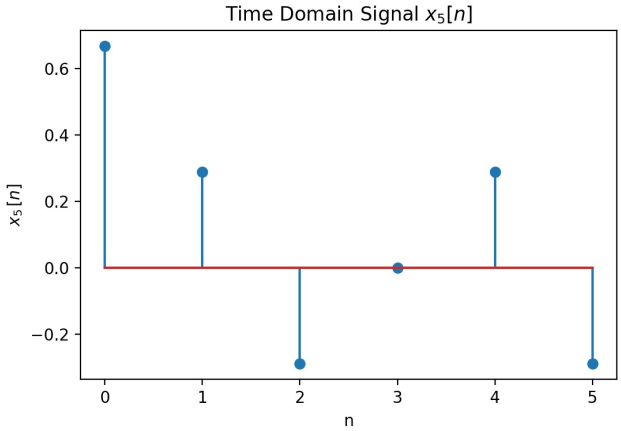
c) $x_3[n] = \cos\left(\frac{2\pi}{6}n\right)$ for $n = 0, 1, \ldots, 5$.



d) $x_4[n] = \sin\left(\frac{4\pi}{6}n\right)$ for $n = 0, 1, \ldots, 5$.



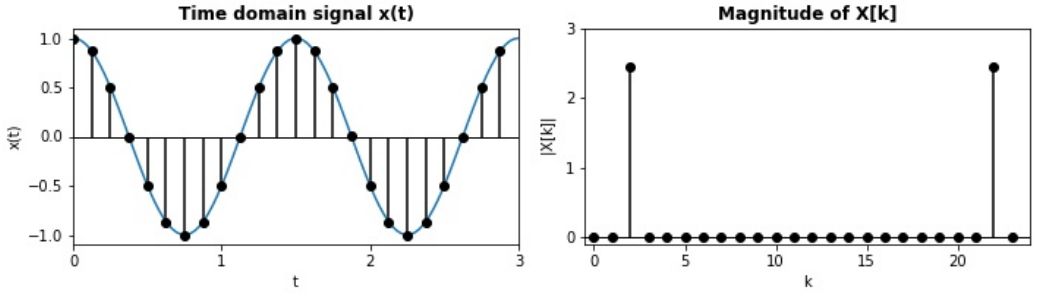
e) $x_5[n] = \frac{2}{3}x_2[n] + \frac{1}{3}x_4[n]$



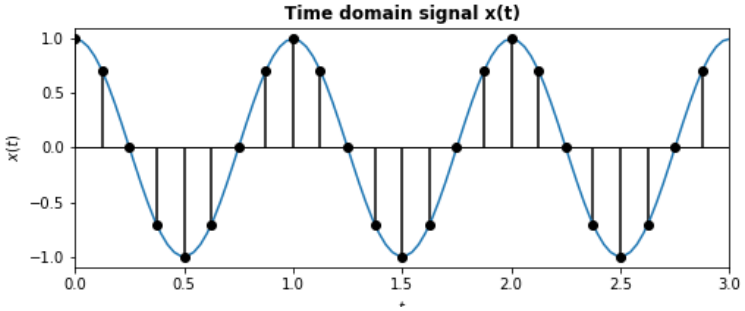
2 DFT Sampling Matching

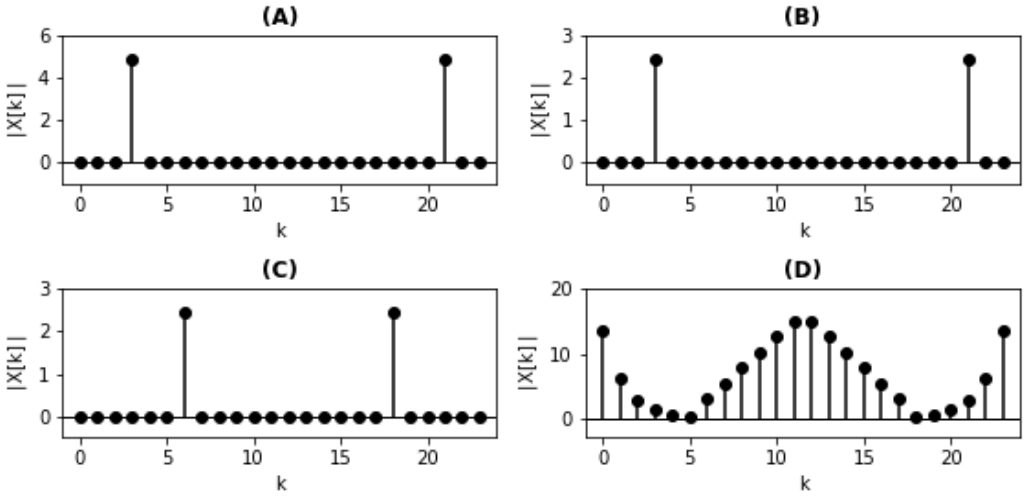
Select the correct answer from the multiple choice options provided and give some justification.

a) A sampled time domain signal and its DFT coefficients are given below:

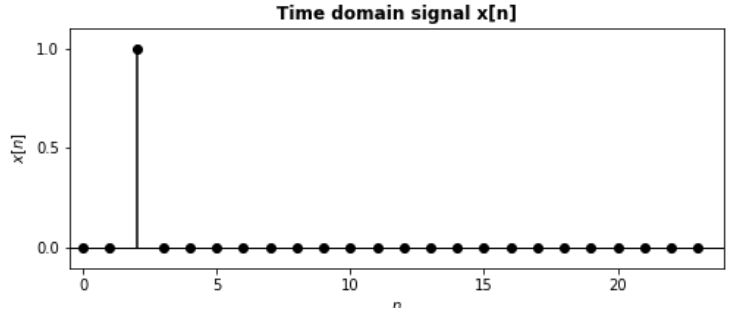


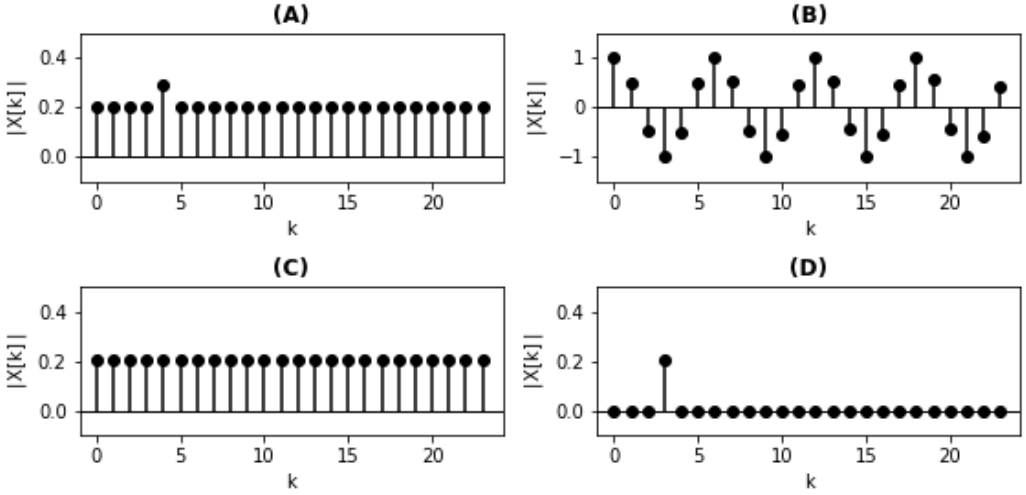
Now given the following time domain signal, which of the options below shows the correct DFT coefficient magnitudes?



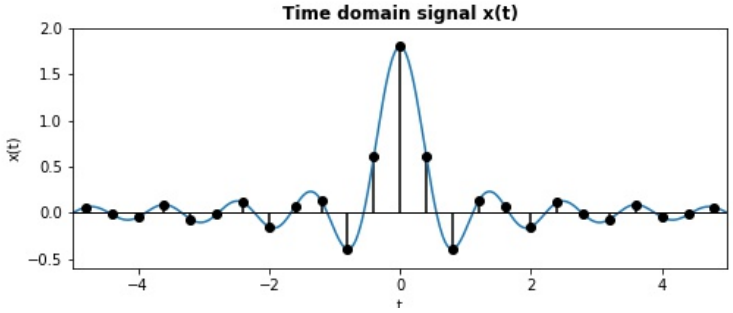


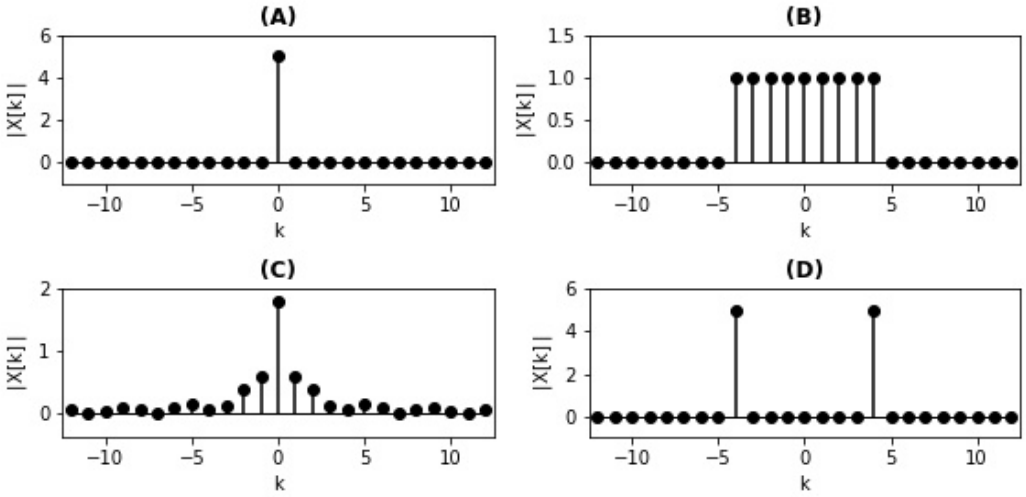
b) Given the time domain signal below, which of the options below shows the correct DFT coefficient magnitudes?





c) Given the time domain signal below, which of the options below shows the correct DFT coefficient magnitudes?





d) Given the time domain signal below, which of the options below shows the correct DFT coefficient magnitudes?