Second Assignment (continue from Homework 1)

Let S(f) be the input of 8 IFFT (Inverse Fast Fourier Transform). (8 input elements and 8 output elements) You can find the command of IFFT in Matlab (or Python).

Use 0 as the first element in S(f) (which is the coefficient of DC).
Use the coefficient of 2Hz frequency component as the second element in S(f).
Use the coefficient of 4Hz frequency component as the third element in S(f).
Use the coefficient of -2Hz frequency component as the 8th element in S(f).
Use the coefficient of -4Hz frequency component as the 7th element in S(f).
All other elements in S(f) is set to 0

The output of IFFT is the samples (t=0, T/8, 2(T/8), 3(T/8), 4(T/8), 5(T/8), 6(T/8), 7(T/8)) of the baseband equivalent signal.

Plot the outputs of IFFT, $m_I(t)$, and $m_Q(t)$ in the same graph. And observe that the output if IFFT is indeed the samples of the baseband equivalent signal.

You can find the theoretic foundation of this observation from the definition of DFT (Discrete Fourier Transform) for any OFDM textbook. FFT has the same definition as DFT. FFT is just a faster (in computation time) version of DFT.