1. Consider the following finite-length sequences with N=8 defined for $0 \le n \le 7$:

   - $x_1[n]$ = [1 1 1 0 0 0 1 1]
   - $x_2[n]$ = [1 1 0 0 0 0 -1 -1]
   - $x_3[n]$ = [0 1 1 0 0 0 -1 -1]
   - $x_4[n]$ = [0 1 1 0 0 0 1 1]

   Without explicitly calculating their DFT, answer the following questions:

   a. Which have a purely real DFT (i.e. which are purely pcs?)

   b. Which have a purely imaginary DFT (i.e. which are purely pca)?

   c. Which have X[k=0] = 0? (Hint: use last homework assignment's answer on what X[k=0] simplifies to).

2. Graphically find this circular convolution: $[6\ 2\ 4] \circledast_3 [1\ 1\ 1]$ if both sequences are finite length starting at n=0.

3. If $x[n] \circledast_5 h[n] = [\ 8\ \ 2\ \ 9\ \ 10\ \ -4]$ (and the answer starts at n=0 as usual), can you find $x[n] \circledast_4 h[n]$? If so, what is it?

4. To find the **linear** convolution of x[n] = [1 2 3] with h[n] = [1 1 1 1 1] using DFTs, how many zeros must you end-pad x and h by? i.e. in Matlab, how many zeros would you have to end-pad x and h by before evaluating `>>ifft(fft(x) .* fft(h))`

5. If you are only interested in graphing the energy density of a signal (i.e. $|X[k]|^2$) does it make a difference if you zero pad the beginning or the end of the signal? Why?