1. Modify the dig_filter.m file from the course website so that it accepts a second argument, w, specifying a weight vector of arbitrary length defining the digital filter. Note that w might be longer than the input signal waveform.

2. Write a Matlab® function called int_poly.m that finds the integral of a polynomial. The input argument for int_poly.m is an array of coefficients of the polynomial (with the coefficient of the highest power of x being the first value in the array). The output of int_poly.m is an array of coefficients of the integral of the polynomial. Note: the integral of ax^n is $\dfrac{ax^{n+1}}{n+1}$. Apply this rule to each term of the polynomial.

3. If the input to int_poly.m is a = [1, 0, 2]; (representing $x^2 + 2$) what is the output of int_poly.m?

4. Write a Matlab® function called udiag.m that extracts value just above the diagonal of a square matrix A. For example:

$$A = \begin{bmatrix} 3 & \boxed{6} & 1 \\ 4 & 5 & \boxed{2} \\ 0 & 7 & 8 \end{bmatrix} \qquad \text{Extract} = \begin{bmatrix} 6 \\ 2 \end{bmatrix}$$

5. Error correction involves finding the closest word in a codebook to a word that is received. Suppose we have the following codebook (with each row being a codeword):
    1 0 1 1 0 1
    1 0 0 1 0 0
    0 1 1 0 1 1
    Write a Matlab® function called dcode.m that finds which codeword is closest to received codeword 1 1 1 0 1 0. (To compute the distance, take the absolute value of the difference between the received word and each code word.)

6. Write a Matlab® function called f_resp.m that computes the product of the distances (abs() of the differences) of a complex number, s1, to each of the complex numbers in an array, s2. (This type of computation is used to find the frequency response of analog filters.)

7. Write a Matlab® function called `stable.m` that returns a logical 1 if a complex number, s, is inside the unit circle, (i.e., has absolute value [magnitude] < 1). (This computation is used to determine whether digital filters produce stable responses.)

8. In Matlab®, what function reads in `.wav` sound files?

9. Write down the Matlab® command for reading in a plain text file with the following contents?
   ```
    3.75\t4.65\n
   -1.05\t3.62\n
   ```
   Note: `\t` means the Tab character, and `\n` means the Newline character.

10. Explain what the "bit depth" for an image file is. (See course website for link to an explanation of the `imread` function.)

REF: [1]   The Mathworks, Inc, *Matlab® Primer,* Natick, MA: The Mathworks, Inc, 2012.