   Conditional Control, pp. 5-2 to 5-5
   Loop Control, pp. 5-5 to 5-8
   Scripts and Functions, pp. 5-10 to 5-13
   Reading and Writing Images: p. 4-24

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. Set the last coefficient (for the constant term) of the integral to zero.

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 values 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. Also, using the Matlab® editor to create the plain text file may cause strange behavior when you use dlmread. It is recommended that you use an editor such as Notepad to create plain text files for data.

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.