ENGR 121: Computation Lab I

Handout for Lab 2: Vectors and Matrices

Practice Exercises

1. Think about what would be produced by the following sequence of statements and expressions. Then type them into MATLAB to verify your answers.

   ```
   pvec = 3:2:10
   pvec(2) = 15
   pvec(7) = 33
   pvec([2:4 7])
   linspace(5, 11, 3)
   logspace(2, 4, 3)
   ```

2. Use the **linspace** function to create a vector identical to the following created with colon notation:

   ```
   t = 4:6:35
   ```

3. Use the colon notation to create the vector identical to the following created with the **linspace** function:

   ```
   v = linspace(-2, 1.5, 8)
   ```

4. Think about what would be produced by the following sequence of statements and expressions. Then type them into MATLAB to verify your answers.

   ```
   mat = [1:3; 44 9 2; 5:-1:3]
   mat(3, 2)
   mat(2,:)
   size(mat)
   mat(:,4) = [8;11;33]
   numel(mat)
   v = mat(3,:)
   v(v(2))
   v(1) = []
   reshape(mat,2,6)
   ```

5. Create a vector variable and subtract 3 from every element in it; create a matrix variable and divide every element by 3; and create a matrix variable and square every element.

6. The following matrix is entered in MATLAB:

   ```
   A = [3 2 1;0:0.5:1;linspace(6,8,3)]
   ```

   Use the colon notation to write a single-line MATLAB command to multiply the second row by the third column and assign the result to variable `C`.

7. Create a matrix variable `mat`. Find as many expressions as you can that would refer to the last element of the matrix, without assuming that you know *a priori* how many elements or rows or columns it has, that is, make your expressions general.

8. Create a 3×5 matrix of random real numbers between 5 and 10. Delete the third row.

9. Create a 3×5 matrix of random integers, each in the inclusive range from -5 to +5. Get the sign of every element.

10. Assume that we have the following vector that erroneously stores negative values. How do we eliminate those negative values? **Hint:** You may either use the concept of logical vectors or the **find** function.

   vec = [11, -5, 33, 2, 8, -4, 25]

11. Modify the above question as follows. Instead of deleting the "bad" elements, retain only the "good" ones, that is, the positive integers.

12. Find the sum of the first n terms of the harmonic series where $n > 1$ is an integer provided by the user:

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \cdots + \frac{1}{n}$$

13. Find the following sum by first creating vectors for the numerators and denominators:

$$\frac{3}{1} + \frac{5}{2} + \frac{7}{3} + \frac{9}{4}$$