Homework assignment - HW2

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- 1. a. Create a row vector **v** with 14 equally spaced elements in which the first element is 7 and the last element is 40.
  - b. Extract the first, fifth and sixth elements of V to a row vector b.
  - c. Extract and swap the two halves of vector V (switch the first 7 elements with the last 7 elements) to a raw vector **c**.
  - d. Extract the second through the next-to-last elements (use **end**) of V to a raw vector d (total 12 elements).
  - h. Reverse the order of the elements of v to a raw vector h.
- 2. For the function  $y = (x^2 + 1)^3 x^3$ , calculate the value of y for the following values of x: -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3. Solve the problem by first creation a vector x, and then creating a vector y, using element-by-element operations.
- 3. The depth of a well, d, in meters can be determined from the time it takes for a stone that is dropped into the well (zero initial velocity) to hit the bottom by:

$$d = \frac{1}{2}gt^2$$
, where t is the time in seconds and g=9.81m/s<sup>2</sup>.

Determine d for t=1, 2, 3, 4, 5, 6, 7, 8, 9 and 10s.

(Create a vector t and determine d using element by element operations).

4. Use Matlab to show that the sum of the infinite series  $\sum_{n=0}^{\infty} \frac{1}{(2n+1)(2n+2)}$ 

Converges to ln(2). Do this by computing the sum for:

b. 
$$n=500$$

c. 
$$n=5000$$

For each part create a vector n in which the first element is 0, the increment is 1 and the last term is 50, 500, or 5000. Then, use element by element operations to

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create a vector in which the elements are  $\frac{1}{(2n+1)(2n+2)}$ . Finally, use the function sum to add the terms of the series. Compare the values obtained in parts a, b, and c to  $\ln 2$ .

- 5. Generate a 10X10 matrix MULT in which its elements contain the multiplication table, use the shortest way.
- 6. Solve the following linear equation using matrices:

- 7. The graph of the function  $f(x) = ax^3 + bx^2 + cx + d$  passes through the points (-2,-3.4),(-0.5,5.525),(1,16.7) and (2.5,70.625). Determine the constants a,b,c, and d. (Write system of four equations with four unknowns and use MATLAB to solve the equations).
- 8. Create a 5 X 7 matrix in which the first row are the numbers 2 4 6 8 10 12 14, the second row are the numbers 16 18 20 22 24 26 28, the third row are the numbers 30 through 42, and so on. From this matrix create a new 3X4 matrix that is made from rows 3 through 5, and columns 4 through 7 of the first matrix.
- 9. Show that for an array with (1000X1000) random numbers in the range of [10:60] the average of the elements is always in the vicinity of 35.
- 10. Write a script that does the following:
  - a. Select a random integer *n* in the range: [3:10].
  - b. Define a vector x with n equally spaced elements in the range  $3 \le x \le 2n$ .
  - c. Sort the vector in a descending order.
  - d. Find the sum of the vector's elements.