Scientific Programming

Homework 4: Due 10/16

Practice problems (not to be turned in) Chapter 7 in the book: 2, 3, 6

Homework problems Do not just turn in the answers to the following problems, show the exact Matlab commands you used to find the answer.

1. A vector is given by: $x = [15\ -6\ 0\ 8\ -2\ 5\ 4\ -10\ 0.5\ 3]$. Using conditional statements and loops, write a program that determines the sum of the positive elements in the vector, and the sum of the negative elements in the vector.

2. Write a script file with if statements and loops which plots the function below in the domain $-2 \leq x \leq 5$.

$$f(x) = \begin{cases} 15 & \text{for} \quad x \leq -1 \\ -5x + 10 & \text{for} \quad -1 \leq x \leq 1 \\ -10x^2 + 35x - 20 & \text{for} \quad 1 \leq x \leq 3 \\ -5x + 10 & \text{for} \quad 3 \leq x \leq 4 \\ -10 & \text{for} \quad x \geq 4 \end{cases}$$

3. Write a script that finds the smallest even integer that is divisible by 7 and whose cube is greater than 40,000. The loop should start at 1 and stop when the number is found.

4. Suppose that x is some positive number and consider the sequence

$$x_0 = x, x_1 = \sqrt{x}, x_2 = \sqrt{x_1} = \sqrt{\sqrt{x}}, \ldots$$

   In general, for $i > 0$, $x_i = \sqrt{x_{i-1}}$. Suppose that x has already been entered into Matlab. Write a while loop that will find the first number n such that $x_n < 10$. For example, if $x = 4096$ then

$$x_0 = 4096, x_1 = \sqrt{4096} = 64, x_2 = \sqrt{64} = 8, x_3 = \sqrt{8}, \ldots$$

   and x_3 is the first term less than 10 so $n = 3$.