Report Assignment III

Problem 1:

- Assumptions: It is assumed that the array to be read is already in memory hence the user should input the number of elements in the searched array also it is assumed the array is integer
- Design Approach:
    a. In this problem a cursor is to be moved on the array in a sequential way and the value of this cursor is to be compared to the user-entered value if there is a match the function returns the index of there is no match the function returns -1

Problem 2:

- Assumptions: The user-input is only limited to 20 bytes
- Design Approach:
    a. In this problem, it is assumed that the middle of the string is a mirror to reverse the array on. After the string is entered, a loop is run on the string to determine how many characters are in there. A cursor is then set on the end, the beginning and middle of the string. The program then starts storing the value of the cursor at the end in the cursor at the beginning and vice versa until they meet at the center of the array. This is implemented by only looping half the elements of the array, since we have to cursors they will cover the whole array that way.

Problem 3:

- Assumptions: the entered number is a string
- Design Approach:
    a. In this problem, four main functions were implemented: checknum, convert to decimal, convert from decimal and the last function is the reverse function from the previous problem
    b. The checknum function checks the user input for the prefix to verify the number system of the entered number. The function returns an integer indicating the number system, e.g. 2 for binary.
    c. For optimization, functions converting each system to the others were replaced by only two functions, one that converts any entered number into decimal and one that converts any desired output from this decimal value. This optimizes the code and decreases larger number of combinations. The function that converts any number into decimal is fed with the output of

the previous checknum to determine from which system to convert to decimal. This function outputs the value in a register not in memory

d. The third function follows the approach of division-reminder to convert the decimal value of the former function into any number system. The number system desired is requested from the user earlier in the main function. This function outputs the desired number into memory and returns the address of the first digit. Note that due to the division reminder approach the number converted is always reversed, the most significant digits are always to the right not to the left.
e. A reverse function is used to get the number into the correct order in memory before again returning the address of the first digit in memory