CSE 2001: Data Structure & Algorithms

Programming Assignment-IV

(Functions)

1. Write a C function “shakespeare” to print the following lines.

   There is a tide in the affairs of men.
   Which, taken at the flood, leads on to fortune.

2. Write a function in C which, given a positive integer n, returns TRUE if n is even and FALSE if n is odd.

3. Write a function in C which given a positive integer n, returns TRUE if n is prime and FALSE otherwise.

4. Write a C function which, given three integers initial, final and increment, prints a table of temperature conversions from Celsius to Fahrenheit. The table ranges from initial to final in steps of increment. {F=32+9*C/5}

5. Write a C function which, given an integer, prints it digit by digit, with one blank after each digit.

6. Write a C function which, given the number of a month, prints the name of the month. For example, given 5, it prints '*May*'.

7. The integers 1, 1, 2, 3, 5, 8,....... are known as Fibonacci numbers. If F_n denotes the n^{th} Fibonacci number, then F can be defined as

   $F_1=1,\ F_2=1$

   $F_n=F_{n-1}+F_{n-2},\ n=3, 4, 5, \ldots\ldots\ldots\ldots$

   that is, each number of the sequence is the sum of the preceding two. Write a C function which, given n, returns the nth Fibonacci number.

8. The exponential function is defined by

   $$e^x=1+x/1!+x^2/2!+x^3/3!+\ldots\ldots\ldots+x^n/n!+\ldots$$

   Write a C function which, given x, returns the value of ex. Assume the existence of the function *factorial*.

9. Write a C function which, given an array of characters containing digits, returns the integer value of the digits.

10. Write a C function which, given an array of characters and an integer *max*, reverses the first max characters in the array. For example ‘*unusual*’ is converted to ‘*lausunu*’.

11. Write a C function which, given a double number x and an integer n, returns the value of x^n.

12. Write a C function which, given an integer n and a base b (<=10), prints the base b equivalent of n.

13. Write a C function which, given three values representing the sides of a triangle, returns

    - 0, if the values cannot be the sides of any triangle. This is so if any value is negative or zero, or if any length is greater than the sum of the other two.
    - 1 if the triangle is equilateral
    - 2 if the triangle is isosceles
    - 3 if the triangle is scalene.

14. Write a C function which, given an integer n, classifies it as "*Perfect*", "*abundant*" or "*deficient*". A number is perfect if the sum of its divisors (excluding the number itself) is equal to the number, e.g. 6. A number is abundant if the sum of the divisors (excluding the number itself) is greater than the number, e.g. 12. A number is deficient if it is neither perfect nor abundant.

15. Write a C function which, given an integer array and its size, returns TRUE if all the elements of array are 0 and FALSE otherwise.

16. Write a C function, which, given an array and its size, determines if the array contains any value which is repeated at least once. Decide what the function should return.

****