Menoufiya University
Faculty of Engineering
Shebin El-Kom
First Semester Examination
Academic Year: 2017-2018

Year:First Year
Department:Electrical Engineering
Subject:ELE112 Computer Applications(1)
Time Allowed: 3 hours
Date: 3/1/2018

Allowed Tables and Charts: No.

Answer of the following questions and assume any missing data.

Question (1) ***(9 Marks)***

(1-a) The period of an oscillating pendulum T (in seconds) is given by the equation

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Where L is the length of the pendulum in meters, and g is the acceleration due to gravity in meters per second. Write A FORTRAN program to calculate the period of a pendulum of Length L. The length of the pendulum will be specified by the user when the program is run. Note that the acceleration due to gravity at the Earth's surface is 9.81 m/sec^2.

(1-b) The distance (d) between two points (x_1,y_1) and $(x_2.y_2)$ on a Cartesian coordinate plane is given by the following equation:

$$d = \sqrt{(x1 - x2)^2 + (y1 - y2)^2}$$

Write a FORTRAN program to calculate the distance between any two points (x_1,y_1) and $(x_2.y_2)$ specified by a user.

(1-c) Write a FORTRAN program to generate a table containing the sine and the cosine of Θ for Θ between 0° and 90°, in 1° increments. The program should properly label each of the column in the table.

Question (2) ***(12 Marks)***

(2-a) Write a FORTRAN program to compute the current flowing in an ac circuit that contains resistance, capacitance, and inductance in series. The current in the circuit is given by

$$\mathbf{I} = \frac{\mathbf{E}}{\sqrt{\mathbf{R}^2 + \left(2\pi\mathbf{fL} - \frac{1}{2 * \pi\mathbf{fC}}\right)^2}}$$

where I = current, amp., E = voltage, volts, R = resistance, ohms.
L = inductance, henry. C = capacitance, farads. f = frequency, cycles per second.

(2-b) A student takes seven tests (on which scores range from 0 to 100), and his final grade is calculated as the average of the six highest scores. Write a FORTRAN program to read the test results calculate and print the final grade.

(2-c) The sine of x (in radians) can be evaluated approximately by summing the first N terms of the series

$$\sin(\mathbf{x}) = \mathbf{x} - \frac{\mathbf{x}^3}{3!} + \frac{\mathbf{x}^5}{5!} - \frac{\mathbf{x}^7}{7!} + \ldots\ldots\ldots$$

Write a program which calculates the sine of 3 radians using the above series and N=1, 2, 3, ..., 8. Compare each answer with that obtained by using the library function SIN(X).

Question (3) ***(12 Marks)***

(3-a) The electricity accounts of residents in a very small town are calculated as follows:

- if 500 units or less are used the cost is 2 cents (100 cents= $1) per unit;
- if more than 500, but not more than 1000 units are used, the cost is $10 for the first 500 units, and then 5 cents for every unit in excess of 500;
- If more than 1000 units are used, the cost is $35 for the first 1000 units plus 10 cents for every unit in excess of 1000;
- In addition, a basic service fee of $5 is charged, no matter how much electricity is used.

Write a program and draw a flow chart which reads the consumptions of the one user and displays the consumption and total charge.

(3-b) The binomial coefficient $\binom{n}{i}$ for nonnegative integers n and i (where $i \leq n$) is defined by $\frac{n!}{(n-i)!i!}$, Write a only a Subroutine contains the two arguments n and i, then compute $\binom{n}{i}$

(3-c)) The root-mean-square r m s average of a series of numbers is the calculated from the following:

$$rms\ average = \sqrt{\frac{1}{N}\sum_{i=1}^{N} x_i^2}$$

Write a FORTRAN Program that will accept an arbtrary number of positive input values and calculate the rms average of the numbers.

Question (4) ***(9 Marks)***

(4-a) Suppose We are given 10 values of a variable x:

11.12 7.5 0.6 12.0 13.0 14.0 18.0 19.0 8.0 2.5

Write a program to find how many values of x lie in each of the following ranges:

(i) $X \leq 5.0$

(ii) $5.0 < x \leq 10.0$

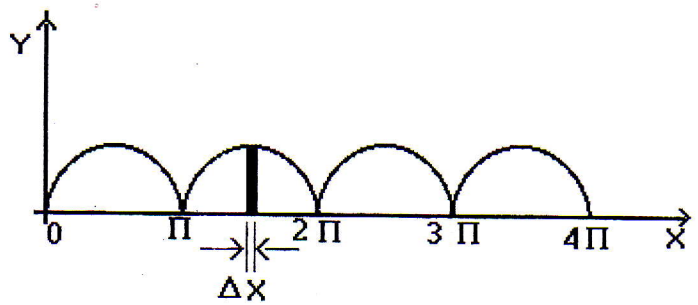
(iii) $10.0 < x \leq 15.0$

(iv) $X > 15.0$

(4-b) Suppose We have a one-dimensional array named Y that contains 32 elements; these are to be regarded as the 32 ordinates of an experimental curve at equally spaced abscissas. Assuming that a value has already been given to H, design a program to compute the integral of the curve T represen approximately by the Y values from :

$$T = \frac{H}{2}\ (\ Y_1 + 2Y2 + 2Y3 \text{ ---- } + 2Y31 + 2Y32\ )$$

(4-c) Write a program to get the average value of the following periodic wave:



Y= sin [x-(k-1)Π] **(k-1)Π ≤ x ≤ k Π** **and k=1,2,3,4 ----**

Note that the **average value** = $\frac{1}{\pi}\int_{(k-1)\pi}^{k\pi} y\Delta X$

Question (5) ***(9 Marks)***

(5-a) Suppose we want to evaluate the quadratic function

$G(x)= x^2 - 5x + 2$

Write a Fortran program using a FUNCTION subprogram G(X), and print out the value of this function as x is increased form 0 to 20 in steps of 0.2

(5-b) Z1, Z2, Z3 and Z4 are complex numbers. Write a FORTRAN program to calculate Z from the following eq.:

$$Z = \frac{Z1 + Z2}{Z3 - Z4}$$

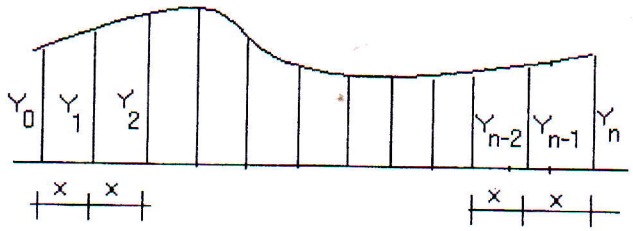
(5-c) Write a Fortran program to compute the area under the curve using the following Simpson's rule:

$$\text{Area} = \frac{x}{3}[y_0 + 2.0(SE) + 4.0(SO) + y_n]$$

Where $SE = y_2 + y_4 + y_6 + -- + y_{n-2}$

and $SO = y_1 + y_3 + y_5 + ----- + y_{n-1}$

n: even number



Question (6) ***(9 Marks)***

(6-a) Write a C-Program to check whether an integer entered by the user is odd or even

(6-b) Write a C-Program to calculate the average value of 10 numbers.

(6-c) Write a C-program to print Grade of student according to his total Marks (zero to 100) as following:

Marks	Grade
Marks => 0 and Marks <50	Fail
Marks => 50 and Marks < 65	Pass
Marks => 65 and Marks < 75	Good
Marks => 75 and Marks < 85	Very Good
Marks => 85 and Marks <= 100	Excellent

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A2, A5, A13	B1, B2, B7, B8	C1,C5,C6	
Question No:	1,2,6	3	4,5	