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King Saud University
College of Engineering
Department Of Chemical Engineering

GE 209 Computer Programming
2ed Semester 1428/1429 H
Time Allowed: 2 Hours

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FINAL EXAMINATION

Question#	Mark
1	
2	
3	
4	
Total	

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QUESTION (1) [10 Pts]

(a) Examine the following Fortran statements and tell whether or not they are valid. If they are invalid indicate the reason.

Statement	**Valid or Invalid**	**Reason**
Loop1: do i=1,10 Loop2: do j=1,10 Loop3: do i=i,j …… End do loop3 End do loop 2 End do loop1		

If (Temp. > 37.0) then
Write(*,*) "High human body temp"
Else if (Temp >100.)
End if		

Real, dimension(12) :: a Real :: ave, sd Integer ::n …….. Call sv_sd(a,n,av,sd) …….. End Subroutine sv_sv(arr,nva,aver,sd) Real ::nva, avr,sd Real :: arr(12) …… Return End		
Implicit none Real :: time Time=10.0 Write(*,*) "Time is", tmie end		

(b) Consider the following program

Real:: A(2:3,5:7) Open (Unit=2, File="IN.DAT",Status="OLD") Read (2,*)A End	An input file IN.DAT contains the following values 5.0, 7.0, 9.0, -10.0,-100.0,999.0
	What are the values of :the following: A(3,5)= A(2,7)= A(1,1)=.....

(c) Examine the following DO loop. Determine the value of ISUM at the end of the loop and also the number of times the loop executes**.**

ISUM=0
DO
ISUM=ISUM + 1
IF (ISUM /10)*10 == ISUM)EXIT
END DO
	ISUM =
	NUMBER of iteration =

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QUESTION (2) [10 Pts]

What will be the values stored in arrays A, B and D and what will be the output of the following FORTRAN program:

```
INTEGER :: I, J,K, L ,  A(4,4), B(4) , D(4,4)
OPEN ( UNIT = 5 , FILE = ' INPUT' , STATUS = ' OLD' )
DO K= 1, 4
     READ (5, *)  (A (K, J), J = 1, 4) , B(K)
END DO
DO I = 1, 4
     DO J = 1, 4
          IF ( I . EQ. J) THEN
              D(I,J) = 1
          ELSE
              D(I,J) = 0
          END IF
    END DO
END DO
PRINT*, B
DO J = 1,4
     PRINT *, (D (I,J) , I = 1,4)
     PRINT*,  (A(I,J), I = 1, 4 )
END DO
CLOSE (5)
STOP
END
```

A=

D=

The Data is Written in the file INPUT as Follows:

```
1    2   3    4   5    6
7    8   9   10  11   12
13  14  15  16  17   18
19  20  21  22  23   24
25  26  27  28  29   30
31  32  33  34  35   36
37  38  39  40  41   42
43  44  45  46  47   48
```

B=

Print out

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QUESTION (3) [10 Pts]

Follow the execution of the following program:

```
PROGRAM Definite_Integral
IMPLICIT NONE
REAL:: A, B
INTEGER:: Number_of_Subintervals
A = 1.0
B = 6.0
Number_of_Subintervals = 5
CALL Integrate (A, B, Number_of_Subintervals)
END PROGRAM Definite_Integral

!Subroutine to calculate the trapezoidal approximation of the integral
!of the function Integrand over the interval [A, B] using N subintervals.

SUBROUTINE Integrate (A, B, N)
REAL:: A, B, Integrand
INTEGER:: J, N
REAL:: DeltaX, X, Y, Sum
DeltaX = (B - A)/ REAL(N)
X = A
Sum = 0.0
DO J = 1, N-1
X = X + DeltaX
Y = Integrand(X)
Sum = Sum + Y
PRINT *, J, Integrand(X), Sum
END DO
Sum = DeltaX + ((Integrand(A) + Integrand(B))/2.0 + Sum)
END SUBROUTINE Integrate

REAL FUNCTION Integrand(X)
REAL:: X
Integrand = X**2
END FUNCTION Integrand
```

PRINT OUT:

J	Integrand(X)	Sum

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QUESTION 4 [10 Pts]

The resistance of a metallic material is increased by increasing the temperature according to the following relation

$$R_2 = R_1[1 + \alpha(T_2 - T_1)]$$

where,

R_1 is the resistance of the material at temperature T_1,

R_2 is the resistance of the material at temperature T_2,

α is temperature coefficient of resistively.

You are given thirty metals each has different α and R_1. For a given values of T_1 and T_2 $(0 < T_1 \leq 100, 50 \leq T_2 < 350)$, write a Fortran program to do the following:

(a) Read the temperatures T_1 and T_2. (***only one reading for each***)

(b) If T_1 and T_2 are not in the given range, print out the following message:

T_1 or T_2 is out of the given range.

(c) For the given range of T_1 and T_2, do the following:

1. Read the α and R_1 for each metal
2. Calculate and print out the value of R_2 for each metal.

(d) Calculate and print out the average value of all resistors R_2 (call it R2av).

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