

King Fahd University of Petroleum and Minerals
 College of Computer Science and Engineering

Information and Computer Science Department

ICS 101 Computer programming using FORTRAN

Second semester 2008/2009 (082)

Final Exam

Sunday, June 21, 2009

Time: 120 minutes

NAME

Key Solution

ID #

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SECTION

MLAIH	Sun & Tue 1:00 pm					
AL-KHALID	Sat & Mon 11:00 am	Sat & Mon 1:00 pm				
AL-YOUSEF	Sat & Mon 7:00 am	Sat & Mon 9:00 am	Sat & Mon 10:00 am	Sun & Tue 8:00 am	Sun & Tue 9:00 am	Sun & Tue 11:00 am

Question #	Points	Grade
1.	8	
2.	9	
3.	10	
4.	6	
5.	8	
6.	6	
7.	8	
8.	15	
9.	15	
10.	15	
Total	100	

Good Luck

Question 1 (8 POINTS)

What is the output of the following program?

```

      INTEGER M(5),N(5),K
      READ*, (M(K),K = 1,5)
      READ*, (N(K),K = 1,5)
      CALL FUN(M,N,5)
      DO 10 K = 2,5,2
10    PRINT*, M(K),N(K)
      END
      SUBROUTINE FUN (A,B,N)
      INTEGER K,N,T,A(N),B(N)
      DO 20 K = 1,N
          T = A(K)+1
          A(K) = B(N+1-K)-1
          B(N+1-K) = T
20    CONTINUE
      RETURN
      END

```

Input:

```

1   6  13  4   3
8  11  18  15  21

```

14	5
10	7

Question 2 (9 POINTS)

What is the output of the following program?

```

      INTEGER A(3,3),K,J
      OPEN(UNIT=2,FILE='INPUT.DAT',STATUS='OLD')
      DO 10 K = 3,1,-1
          DO 10 J = K,1,-1
              IF(K.EQ.J) THEN
                  READ(2,*) A(K,J)
              ELSE
                  READ(2,*) A(K,J),A(J,K)
              ENDIF
10    CONTINUE
      DO 20 K = 1,3
20    PRINT*, (A(K,J), J = 1,3)
      END

```

output

18	11	17
21	6	14
16	13	20

INPUT.DAT file

20	4
13	14
16	17
6	15
21	11
18	19

Question 3 (10 POINTS)

What is the output of the following program?

```

B = 5.42
C = 9.358
M = 472
PRINT 10, B, M, 'KFUPM'
10  FORMAT(1X, F5.3, I4, 2X, A)
    PRINT 20, B, 'ICS101', C
20  FORMAT('0', F3.1, A7, F5.2)
    PRINT 30, C, M, 'FORTRAN', B
30  FORMAT(' ', F6.4, 1X, I2, 1X, A3, F5.2)
    END

```

1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
5	.	4	2	0		4	7	2			K	F	U	P	M				
5	.	4		I	C	S	1	0	1		9	.	3	6					
9	.	3	5	8	0		*	*		F	O	R		5	.	4	2		

Question 4 (6 POINTS)

```

INTEGER J, K, M
OPEN (UNIT=8, FILE='INPUT.DAT', STATUS='OLD')
DO 10 J = 1, 20
10  READ(8, *, END=30) (M, K = 1, N)
30  PRINT*, J, K, M
    END

```

The contents of the file 'INPUT.DAT' are:

17	31	64	16	27	29
78	26	21	45	48	25

Output when the limit of the implied loop $N = 7$

2	1	78
----------	----------	-----------

Output when the limit of the implied loop $N = 14$

1	13	25
----------	-----------	-----------

Question 5 (8 POINTS)

What will be the values of array X after executing the following program?

```

INTEGER X(2,4),K,J
OPEN(UNIT=10,FILE='INPUT1.DAT',STATUS='OLD')
OPEN(UNIT=20,FILE='INPUT2.DAT',STATUS='OLD')
READ(10,*)((X(J,K),K=1,4,2),J=1,2)
READ(20,*)((X(K,J),K=1,2),J=2,4,2)
DO 30 K = 1,2
30 PRINT*,(X(K,J),J=1,4)
END
    
```

output

7	21	12	27
14	16	19	38

INPUT1.DAT file INPUT2.DAT file

7
12
14
19

21
16
27
38

Question 6 (6 POINTS)

What is the output of the following program?

```

INTEGER A(3,4),K,J,M
READ*,((A(K,J),J=1,4),K=1,3)
J = 1
DO WHILE (J.LE.4)
M = 999
DO 10 K = 1,3
IF(A(K,J).LT.M) M = A(K,J)
10 CONTINUE
PRINT*, M
J = J + 1
END DO
END
    
```

3
14
6
18

Input:

9	14	11	18	10	17
6	19	3	16	15	22

Question 7 (8 POINTS)

Assume that A is defined as INTEGER A(2,0:4) and the storage of array A in the memory is shown below. What is the output of the following code?

```

PRINT*,((A(K,J),J = 1,4,4),K = 1,2)
PRINT*,(A(2, J/2),J = 0,9,5)
    
```

memory
7
10
9
6
1
3
1
4
8
5

9	6
10	3

Question 8 (15 POINTS)

Circle the correct answer

[1] To convert $r = \frac{\cos(5a)}{3a}$ to FORTRAN statement, we write:

a. FORTRAN language does not has an intrinsic function COS

b. R = COS(5*A)/(3*A)

c. R = CALL COS(5*A)/(3*A)

d. R = CALL (COS(5*A)/3)*A

[2] Which of the following sentences is NOT CORRECT?

a. Two-Dimensional arrays can be passed to a subprogram.

b. All arrays must be declared.

c. INTEGER B(M) is valid as long as both B and M are dummy arguments

d. The declaration DIMENSION B is valid if the size of the array is specified in the program.

[3] Assume that A is a two-dimensional array of size 4 by 6. Which of the following codes is equivalent to READ*,A statement?

<input checked="" type="radio"/> a. READ*, ((A(K,J),K=1,4),J=1,6)	b. READ*, ((A(K,J),K=1,6),J=1,4)
c. DO 20 K = 1, 6 READ*, (A(K,J),J=1,4) 20 CONTINUE	d. DO 10 J = 1, 4 READ*, (A(K,J),K=1,6) 10 CONTINUE

[4] The following program generates an error message

```
M = 613452.45
R = 2.
20  FORMAT (' ', F4.2)
    PRINT 20, M
END
```

The reason of error message is

a. The variable R is assigned by an incorrect constant value

b. There are no enough positions to print the variable M

c. The **F** specification is only used to print the value of M

d. FORMAT statement is placed before the print statement

[5] Assume a file is opened as

```
OPEN(UNIT=3,FILE='EXAM.DAT',STATUS='OLD')
```

Which of the following sentences is equivalent to REWIND(3)?

a. OPEN(UNIT=3,FILE='EXAM.DAT',STATUS='OLD')
CLOSE(3)

b. OPEN(UNIT=3,STATUS='NEW')

c. OPEN(UNIT=3,FILE='EXAM.DAT',STATUS='NEW')
CLOSE(3)

d. CLOSE(3)
OPEN(UNIT=3,FILE='EXAM.DAT',STATUS='OLD')

Question 9 (15 POINTS)

Assume the following declarations

```
INTEGER X(5,7), SUM, MAX
INTEGER R, C
```

Answer the following questions based on the above declarations

Complete the missing part to read all the elements of array X row-wise from single input data line

[2 marks]

```
READ*, ((X(R,C), C = 1, 7), R = 1, 5)
```

Complete the missing parts to print one column of X per line

[3 marks]

```
DO 10 C = 1, 7
```

```
PRINT*, (X(R,C), R = 1, 5)
```

```
10 CONTINUE
```

Complete the missing parts to obtain the sum of the elements values of column 2

[4 marks]

```
SUM = 0
```

```
DO 20 R = 1, 5
```

```
SUM = SUM + X(R, 2)
```

```
20 CONTINUE
```

Complete the missing parts to obtain the maximum element value of row 3

[6 marks]

```
MAX = X(3, 1)
```

```
DO 30 C = 2, 7
```

```
IF (X(3,C) .GT. MAX) MAX = X(3,C)
```

```
30 CONTINUE
```

Question 10 (15 POINTS)

Complete the subroutine CALC that receives real 2-D array A of size 4x6 , and returns 2 results SUMPOS and SUMNEG. SUMPOS represents the Sum of the positive values in the array and SUMNEG represents the sum Of the negative values in the array.

```
SUBROUTINE CALC (A, SUMPOS, SUMNEG)

REAL A (4, 6)

SUMPOS = 0.0

SUMNEG = 0.0

DO 10 I = 1, 4

    DO 10 J = 1, 6

        IF (A (I, J) .GT.0) THEN

            SUMPOS = SUMPOS + A (I, J)

        ELSEIF (A (I, J) .LT.0) THEN

            SUMNEG = SUMNEG + A (I, J)

        ENDIF

    10 CONTINUE

    RETURN

END
```