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KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

Information and Computer Science Department

2008/2009 Summer Semester (Term 083)
ICS101 Computer Programming (2-3-3)
Section 03

FINAL EXAM

WEDNESDAY, 2 SEPTEMBER 2009
120 MINUTES

Student Information

Name:	KEY SOLUTION					
KFUPM ID:						

IMPORTANT NOTES

- This is a close material exam. So, remove any relevant material.
- Questions are ONLY allowed during the first 15 minutes.
- In FORTRAN, **5** and **5.0** are totally two different values.
- Make sure you have 10 questions and 7 pages including this page.

Scored Marks

Question No.	Maximum Mark	Score
1	06	
2	11	
3	09	
4	10	
5	10	
6	10	
7	06	
8	14	
9	10	
10	14	
TOTAL	100	

~ GOOD LUCK! ~

Question 1 (06 points)

What is the output of the following FORTRAN program?

```
      INTEGER X(6), M, K
      OPEN(UNIT=10, FILE='INPUT1', STATUS='OLD')
      OPEN(UNIT=20, FILE='INPUT2', STATUS='OLD')
      M = 0
10    M = M + 1
      READ(10,*) X(M)
      IF(X(M).GT.0) GOTO 10
20    M = M + 1
      READ(20,*) X(M)
      IF(X(M).GT.0) GOTO 20
      PRINT*, (X(K), K = 1, M)
      END
```

WRITE YOUR OUTPUT HERE

5 2 0 9 0

Assume the content of the files is:

INPUT1	INPUT2
5	9
2	0
0	7
8	0
0	

Question 2 (11 points)

What is the output of the following FORTRAN program?

```
      CHARACTER*6 COURSE*7

      X = -29.169
      N = 2121
      COURSE = 'ICS101'
      PRINT 10, X, COURSE, N
      PRINT 20, N, X, 'COURSE'
      PRINT 30, X, N, 'FINAL'
      PRINT 40, 55.5
10    FORMAT(4X, F8.1, 2X, A, I3)
20    FORMAT(' ', I6, '!=', F9.4, X, A2)
30    FORMAT('0', 6X, 'X=', F6.3, 'N=', I4, A7, 'EXAM')
40    FORMAT('+', F5.2)
      END
```

WRITE YOUR OUTPUT IN THE TABLE BELOW

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
						-	2	9	.	2			I	C	S	1	0	1		*	*	*								
		2	1	2	1	!	=		-	2	9	.	1	6	9	0		C	O											
5	5	.	5	0		X	=	*	*	*	*	*	*	N	=	2	1	2	1			F	I	N	A	L	E	X	A	M

Question 3 (09 points)

Given the following FORTRAN program, do as indicated in each part.

```
      INTEGER I, J, M
      OPEN(UNIT=20, FILE='DATA.TXT', STATUS='OLD')
      DO 88 I = 1, 10
88          READ (20,*, END=99) (M, J = 1, N)
99    PRINT*, I, J, M
      END
```

Assume the content of file DATA.TXT is:

```
12    14    77    61    11    34    88
16    87    21    45    71
15    99    70
22
```

A. What is the output if the value for N equals to **2**?

WRITE YOUR OUTPUT HERE

```
4     2     22
```

B. What is the output if the value for N equals to **8**?

WRITE YOUR OUTPUT HERE

```
2     5     22
```

C. What is the output if the value for N equals to **17**?

WRITE YOUR OUTPUT HERE

```
1     17    22
```

Question 4 (10 points)

What is the output of the following FORTRAN program?

```
      INTEGER A(6), B(6), C(6)
      READ*, B, C
      CALL FUN(A, B, C, 4)
      PRINT*, A
      END
      SUBROUTINE FUN(X,Y,Z,N)
      INTEGER X(N), Y(N), Z(N)
      DO 22 I=1,N
22          X(I) = Y(Z(I))
      RETURN
      END
```

WRITE YOUR OUTPUT HERE

```
9     -8    -7    3     0     0
```

Assume the input is:

```
4     9     -7    2     -8    3     2
5     3     6     1     4     2
```

Question 5 (10 points)

What is the output of the following FORTRAN program?

```
      INTEGER A(10,10), B(10), J, K, N
      REAL C, X
      READ*, N,((A(K,J), K = 1, N), J = 1, N), (B(K), K = 1, N)
      X = C(A,B,N)
      PRINT*, A(1,1),A(2,2)
      END
      REAL FUNCTION C(A,B,N)
      INTEGER A(10,10), B(10), J, N
      C = 0.0
      DO 10 J = 1, N
            IF (J/3*3.NE.J) THEN
                  C = C+B(J)+A(J, J)
                  A(J,J) = B(J)
                  IF(J.EQ.N) PRINT*, C
                  PRINT*, A(J,N-J+1)
            ENDIF
10    CONTINUE
      RETURN
      END
```

WRITE YOUR OUTPUT HERE
4
31.0
9
7 5

Assume the input is:

```
2     8     9     4     11    7     5
```

Question 6 (10 points)

Complete the missing parts in the FORTRAN program given below to construct the following matrix:

$$A = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 2 \\ 0 & 1 & 2 & 2 \\ 1 & 2 & 2 & 2 \end{bmatrix}$$

```
      INTEGER A(4,4)
      DO 10 K = 1, 4
            DO 10 ___1___
                  IF(___2___) THEN
                        A(K,L) = ___3___
                  ELSEIF(___4___) THEN
                        A(K,L) = ___5___
                  ELSE
                        A(K,L) = ___6___
                  ENDIF
10    CONTINUE
      END
```

	WRITE YOUR CODE HERE
1	L = 1, 4
2	K+L.LT.5
3	0
4	K+L.EQ.5
5	1
6	2

Question 7 (06 points)

Answer each part by circling the letter next to the correct answer.

Part I

Assume the following array declaration is given.

```
INTEGER AR(100,100)
```

Which of the following READ statements will read the array row-wise if the data is given one value per line?

CIRCLE THE LETTER NEXT TO THE CORRECT ANSWER

A.	`READ*, AR`

B.	`DO 20 J = 1, 100`
	`  READ*, (AR(K,J), K = 1, 100)`
	`20  CONTINUE`

C	`READ*, ((AR(K,J), K = 1, 100) J = 1, 100)`

D.	`DO 55 K = 1, 100`
	`  DO 55 J = 1, 100`
	`  READ*, Z(J,K)`
	`55  CONTINUE`

E.	None of the above

Part II

Assume that a file called DATA is opened for writing with unit equals to 60. Which of the following statements is equivalent to REWIND(60)?

CIRCLE THE LETTER NEXT TO THE CORRECT ANSWER

A.	`OPEN(UNIT=60, FILE='DATA', STATUS='OLD')` `CLOSE(60)`
B.	`OPEN(UNIT=60, FILE='DATA', STATUS='NEW')` `CLOSE(60)`
C.	`CLOSE(60)` `OPEN(UNIT=60, FILE='DATA', STATUS='OLD')`
D.	`CLOSE(60)` `OPEN(UNIT=60, FILE='DATA', STATUS='NEW')`
E.	None of the above

Part III

Assume the following FORMAT statement is given:

```
10    FORMAT(' ', 3X, F6.2, 'SUM=', I5, 2X)
```

Which of the following FORMAT statements is equivalent to the above one?

CIRCLE THE LETTER NEXT TO THE CORRECT ANSWER

A.	`10  FORMAT(2X, F6.2, 'SUM=', I5, 2X)`
B.	`10  FORMAT(3X, F6.2, 'SUM=', I5, 2X)`
C.	`10  FORMAT(4X, F6.2, 'SUM=', I5, 2X)`
D.	`10  FORMAT(5X, F6.2, 'SUM=', I5, 2X)`
E	None of the above

Question 8 (14 points)

Answer with '**T**' for the correct statements and '**F**' for the wrong statements.

1	The OPEN statement for a data file must precede any READ or WRITE statements that uses that file.	T
2	The OPEN statement for a file should be executed only once in the program.	F
3	A two-dimensional array is stored in the computer memory as a one-dimensional array with row 1 first, followed by row 2 and so on.	F
4	A FORMAT statement must be after the PRINT statement that uses it.	F
5	A file can be open for reading and writing at the same time.	F
6	A declaration such as INTEGER SUM(M,N) is valid in a subprogram but not in a main program.	T
7	The following OPEN statement will produce an error message at run time if the file INPUT.TXT is available. `OPEN(UNIT=7, FILE='INPUT.TXT', STATUS='UNKNOWN')`	F

Question 9 (10 points)

Write a FORTRAN function ICOUNT that receives an INTEGER two-dimensional array AR and an INTEGER argument S. AR consists of 20 columns and 30 rows. The function should count and return how many elements in AR equals to S.

WRITE YOUR CODE HERE

```
      INTEGER FUNCTION ICOUNT(AR,S)
      INTEGER AR(30,20), S
      ICOUNT = 0
      DO 10 ROW = 1, 30
            DO 10 COL = 1, 20
                  IF(AR(ROW,COL).EQ.S) ICOUNT = ICOUNT + 1
10    CONTINUE
      RETURN
      END
```

Question 10 (14 points)

Given a file called INPUT.DAT that contains unknown number of integer values with each value stored on a separate line. Write a FORTRAN program that read the above file and put the even numbers in a file called EVENS.DAT and the odd numbers in a file called ODDS.DAT. Also, print to the screen how many even and odd values are in the file.

WRITE YOUR CODE HERE

```
      OPEN(UNIT=1, FILE='INPUT.DAT', STATUS='OLD')
      OPEN(UNIT=2, FILE='EVENS.DAT', STATUS='UNKNOWN')
      OPEN(UNIT=3, FILE='ODDS.DAT', STATUS='UNKNOWN')

      EVENC = 0
      ODDC = 0
11    READ(1, *, END=99) NUM
      IF(MOD(NUM,2).EQ.0) THEN
            WRITE(2,*) NUM
            EVENC = EVENC + 1
      ELSE
            WRITE(3,*) NUM
            ODDC = ODDC + 1
      ENDIF
      GOTO 11

99    CLOSE(1)
      CLOSE(2)
      CLOSE(3)

      PRINT*, 'NUMBER OF EVEN VALUES', EVENC
      PRINT*, 'NUMBER OF ODD VALUES', ODDC
      END
```