KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
Information and Computer Science Department
2012 Fall Semester (Term 121)
ICS103 Computer Programming in C (2-3-3)
FINAL EXAM
TUESDAY JANUARY 1, 2013
120 MINUTES

Test Code	001
Name:	
KFUPM ID:	

Section:					
	Ali Al-Suwayan	☐ SM 07am	☐ SM 08am		
	Adil Al-Suhaim	☐ SM 07am	☐ SM 08am	☐ SM 11am	☐ SM 1:10pm
	M El-Attar	☐ SM 07am	☐ SM 08am		
	Abdullah Al-Sukairy	☐ SM 11am			
	El-Sayed Al-Alfy	☐ SM 08am	☐ SM 1:10pm		
	Amin Al-Hashim	☐ UT 07am	☐ UT 08am	☐ SM 09am	
	Ahmad Al-Herz	☐ UT 07am	☐ UT 08am	☐ UT 09am	
	Ahmad Akram	☐ UT 07am	☐ UT 08am	☐ UT 09am	
	M Balah	☐ UT 07am	☐ UT 11am		
	Emad Ramadan	☐ UT 11am	☐ UT 1:10pm		
	M. Al-Mulhem	☐ UT 11am	☐ UT 1:10pm		
	Mohammad Said	☐ UT 1:10pm			

Scored Marks

Questions	Max. Mark	Score
1 to 38	76	
39 to 46	24	
TOTAL	100	

IMPORTANT NOTES

△ Fill-in your information on the answer sheet.
△ **Mark your answers on the answer sheet.**
△ **The answer sheet is the only one that will be graded.**
△ Do NOT start the exam until you are instructed to do so.
△ This is a closed material exam. So, remove any relevant material.
△ Calculators are NOT allowed. If you have one, put it on the floor.
△ Mobile phones are NOT allowed. If you have one, switch it off NOW.

Good Luck

Select the correct answer and mark it on the answer sheet.

1) What is the output of the following code fragment?

```
double x = -3.14159;
printf("%.4f",x);
```

```
A. -3.1415
B. 3.1416
C. 3.1415
D. -3.1416
```

2) What is the value of variable **c** after executing the following statements?

```
int a = 4;
int b = 7;
int c = ++a * b++;
```

```
A. 40
B. 35
C. 32
D. 28
```

3) What is the value of **z** after executing the following code fragment?

```
int k = 2;
int x = 3;
double z =  x / k;
```

```
A. 2.0
B. 1.5
C. 1.0
D. 1
```

4) What is the output of the following code fragment?

```
int i, counter1 = 0, counter2=0;
for(i=0; i<10; i++)
counter1++;
for(i=15; i<=20; i=i+2)
counter2++;
printf("%d %d", counter1, counter2);
```

```
A. 10 3
B. 9   4
C. 10 4
D. 9   3
```

The next 3 questions (5, 6, and 7) are based on the following code fragment:

```
scanf("%d%d",&x,&y);
if(10<x && x<20)
    if(y>=10 || y<5)
        if (x>= 16)
            printf("A");
        else
            printf("B");
      else
        if(y >= 6)
           printf("C");
        else
           printf("D");
  else
    printf ("E");
```

5) What is displayed on the screen if **x = 17** and **y = 6**?

```
A. A
B. B
C. C
D. D
```

6) What is displayed on the screen if **x = 15** and **y = 5**?

```
A. A
B. B
C. C
D. D
```

7) What is displayed on the screen if **x = 12** and **y = 12**?

```
A. A
B. B
C. C
D. D
```

8) What is the final value of **x** when the following code fragment is executed?

```
int x=0;
if(x = 0)
    x=1;
```

```
A. 2
B. -1
C. 0
D. 1
```

9) What is the output of the following code fragment?

```
for(n = 1; n <= 4; n++){
    for(k=1; k <= 2*n; k=k+2)
        printf("*");
    printf("\n");
}
```

A. ****
   ***
   **
   *

B. *
   **
   ***
   ****

C. **
   ****
   ******
   ****

D. ********
   ******
   ****
   **

10) Assume the following declaration and initialization statement:

```
int x=3, y, z;
```

Which is a correct call for a function with the following header?

```
void dim(int x, int *y, int *z)
```

A. dim(int x, int &y, int &z);
B. dim(x, &y, &z);
C. void dim(x, &y, &z);
D. dim(x, y, z);

The next 2 questions (11 and 12) are based on the following code fragment:

```
int x = 7, y = 2;
int *p1, *p2, *temp;
p1 = &x;
p2 = &y;
*p1 = *p1 + *p2;
*p2 = x - *p2;
*p1 = y + 1;
```

11) What is the final value of **x**?

```
A. 8
B. 3
C. 7
D. 2
```

12) What is the final value of **y**?

```
A. 2
B. 8
C. 7
D. 3
```

13) Assume the following declaration and initialization statement:

```
int n=2, m=4, z;
```

Which is a correct call for the following function?

```
int avg(int x, int y){return (x+y)/2;}
```

```
A. avg(int n, int m);
B. z = avg(n, m);
C. int avg(n, m);
D. z = int avg(n, m);
```

14) The proper prototype for a function that adds two arrays **A** and **B** of size **n** and puts the result into array **C** is:

```
A. void addArray(int A[], int B[], int *C[], int n);
B. void addArray(int A[], int B[], int C[], int n);
C. int [] addArray(int A[], int B[], int n);
D. void addArray(int *A[], int *B[], int *C[], int n);
```

15) What is the output due to the function call:

```
display(2);
```

which has the following definition:

```
void display(int n){
  if(n > 0){
    printf("R");
    display(n - 1);
    printf("D");
  }
}
```

A.	RDRD
B.	RRRD
C.	RRDD
D.	RRRR

16) What is the value of x:

```
int x = tri(tri(3));
```

The function **tri** has the following definition:

```
int tri(int a) {return 2*a;}
```

A. 12
B. 9
C. 6
D. 3

17) Consider the following code fragment:

```
int x[3][3],i,j,k=1;
for(i=2;i>=0;i--){
  for(j=0;j<3;j++){
    x[i][j]=k;
    k++;
  }
}
```

What will be the elements of array **x** at the end of the above code?

A. 1 2 3	B. 4 5 6	C. 7 8 9	D. 7 4 1
4 5 6	7 8 9	4 5 6	8 5 2
7 8 9	1 2 3	1 2 3	9 6 3

18) Consider the following code fragment:

```
int x[3][3],i,j,k=1;
for(j=0;j<3;j++){
   for(i=0;i<3;i++){
      x[i][j]=k;
      k++;
   }
}
```

What will be the elements of array **x** at the end of the above code?

A. 1 2 3	B. 1 4 7	C. 7 8 9	D. 7 4 1
4 5 6	2 5 8	4 5 6	8 5 2
7 8 9	3 6 9	1 2 3	9 6 3

19) Assume the following declaration statement:

```
int x[4];
```

Which is a correct call for a function with the following header?

```
void test(int a[], int size)
```

```
A. test(&x,4);
B. test(x, 4);
C. void test(x,4);
D. test(x[],4);
```

20) Consider the following code fragment:

```
int i;
int A[]= {2, 4, 6, 8, 10, 1, 3};
for(............................;............................;............................)
   printf("%d ", A[i]);
```

Complete the loop parameters to get the following output: 3   10   6

```
A. i= 6; i > 0; i=i-2
B. i= 6; i >=0; i=i-2
C. i= 0; i <3; i++
D. i= 6; i > 0; i--
```

21) Consider the following array:

int x[]={2, 4, 11, 7, 9, 3};

Using the *linear search* function, how many <u>comparisons</u> will be conducted if the target value is 10?

```
A.  5
B.  3
C.  2
D.  6
```

22) Consider the following array:

```
int x[9]={ 4, 11, 13, 19, 21, 34, 46, 67, 85};
```

and consider searching for the value 67 by the *recursive binary search* covered in the class and having the following prototype:

```
int binarySearch (int x[], int first, int last, int target);
```

the values of **first** and **last** in the second call to binary search are:

```
A. first=1, last=8
B. first=0, last=4
C. first=5, last=8
D. first=5, last=9
```

23) Consider the following array:

```
int x[9]={4, 11, 13, 19, 21, 34, 46, 67, 85};
```

and consider searching for the value 1 by the *recursive binary search* covered in the class. The first 2 values of the array compared to the target value 1 are:

```
A. 4   and 11
B. 85 and 67
C. 21 and 13
D. 21 and 11
```

24) Which two header files need to be included when using `gets` and `strlen` functions?

```
A. ctype.h, stdio.h
B. stdlib.h, string.h
C. stdio.h, string.h
D. ctype.h, string.h
```

25) What will be printed by the following program?

```
#include <stdio.h>
int chk(int x, int y, int z);
int main(void){
   int x[]={10, 15, 20};
   if(chk(x[0], x[1], x[2]))
       printf("1");
   else if(chk(x[1], x[0], x[2]))
       printf("2");
   else if(chk(x[2], x[1], x[0]))
       printf("3");
   else
       printf("4");
   return 0;
}

int chk(int x, int y, int z){
 return x<y && y<z;
}
```

```
A. 1
B. 2
C. 3
D. 4
```

26) Consider the following code fragment:

```
        char str1[15]="Hello#World";
        int len = strlen(str1);
```

What is the value of the variable **len**?

```
A. 12
B. 11
C. 14
D. 15
```

27) What will be printed by the following program?

```c
#include <stdio.h>
int func (int x[]);
int main(void){
  int x[]={2, 5, -1, 3};
  printf("%d ", func(x));
  return 0;
}

int func(int a[]){
  int s  = 0, i;
  for(i=0; a[i]!=-1; ++i)
    s = s + a[i];
  return s;
}
```

```
A. 7
B. 9
C. 6
D. 10
```

28) What will be the output of the following code fragment? (Assume the symbol ⊔ refers to a space)

```c
char x[]="Hello World";
printf("%-12s",x);
```

```
A.        Hello
B.  Hello World
C. HelloWorld
D. Hello World
```

29) What will be printed by the following program?

```c
#include <stdio.h>
#include <string.h>
int main(void){
  char x[]={'h', 'a', 'w', 'a', 'i', '\0'};
  printf("%d ", strcmp(x, "hi"));
  return 0;
}
```

```
A. Positive value
B. 0
C. Negative value
D. None of the above
```

30) What will be printed by the following program? (Assume the symbol ␣ refers to a space)

```c
#include <stdio.h>
#define N 8
int main(void){
    char x1[N]="Short";
    char x2[N]="Strings";
    printf("%s", x1);
    printf("%s", x2);
    return 0;
}
```

```
A.    ShortStrings
B.    Short
      Strings
C.    Short Strings
D.    Short   Strings
```

The next 2 questions (31 and 32) are based on the following code fragment:

```c
char *token, result[80] = "", delim[] = "%";
char str[] ="121%ICS-103%IS%A%GREAT%COURSE";
token = strtok(str, delim);
while(token != NULL){
 if(strlen(token)>3)
    puts(token);
 strcat(result, token);
 token = strtok(NULL, delim);
}
```

31) What is the output of the above code fragment?

```
A. ICS-103 GREAT COURSE
B. ICS-103
   GREAT
   COURSE
C. 121 ICS-103 IS A GREAT COURSE
D. GREAT
   COURSE
```

32) What will be the content of the string **result** after the **while** loop?

```
A. 121%ICS-103%IS%A%GREAT%COURSE
B. ICS-103%GREAT%COURSE
C. ICS-103GREATCOURSE
D. 121ICS-103ISAGREATCOURSE
```

33) Which of the following statements is a valid function prototype for a function receiving a 2-D array as argument where **ROWS** and **COLS** are defined constants?

```
A. void fun (int A[][], int nrows, int ncols);
B. void fun (int A[ROWS][], int nrows, int ncols);
C. void fun (int A[int nrows][int ncols]);
D. void fun(int A[][COLS], int nrows, int ncols);
```

34) Consider the following declaration and initialization:

```
        char planets[3][20] = {"Mercury", "Venus", "Earth"};
```

What is the correct statement to print the word **Mercury**?

```
A. printf("%s", planets[0][7]);
B. printf("%s", planets[0][0]);
C. printf("%s", planets[1]);
D. printf("%s", planets[0]);
```

35) Which of the following is a valid declaration and initialization statement?

```
A. int A[][4]  =  {{2,1,1},{3,4}};
B. int A[2][]  =  {{2,1,1},{3,4}};
C. int A[][]  =  {{2,1,1},{3,4}};
D. None of the above
```

36) What is the output of the following code fragment?

```
int x[3][3]={{1,2},{3},{4,5,6}};
int i,j;
for(j=2;j>=0;j--)
  for(i=2;i>=0;i--)
    printf("%d ",x[i][j]);
```

```
A. 6 0 0 5 0 2 4 3 1
B. 1 2 3 4 5 6 0 0 0
C. 0 0 6 2 0 5 1 3 4
D. 6 5 4 0 0 3 0 2 1
```

37) What is the content of the array **x** after the following code fragment?

```
int x[3][3],i,j;
for(j=0;j<3;j++)
  for(i=0;i<3;i++)
    if( i == j)
        x[i][j] = 0;
    else if (i>j)
        x[i][j]= 1;
    else
        x[i][j]= -1;
```

```
A. 0  1  1
  -1  0  1
  -1 -1  0

B. 1  0  0
  -1  1  0
  -1 -1  1

C. 0 -1 -1
   1  0 -1
   1  1  0

D. 1 -1 -1
   0  1 -1
   0  0  1
```

38) Suppose a text file contains the following **7** values as follows:

```
10
6   9 -3
5  10
3
```

and it is associated with the file variable **infile** for reading. What is the value of the variable **cnt** after the loop in the following code fragment?

```
char x[80], *status;
int cnt = 0;
status = fgets(x, 80, infile);
while (status != NULL) {
  cnt++;
  status = fgets(x, 80, infile);
}
```

```
A. 3
B. 7
C. 6
D. 4
```

39) What is the output of the following program?

```c
#include <stdio.h>
#include <string.h>
int main() {
    char a[20],b[]="stmw",c[]="abcd";
    int i,len;
    len=strlen(b);
    for(i=0;i<len;i++) {
        a[2*i]=c[len-1-i];
        a[2*i+1]=b[len-1-i];
    }
    a[2*len]='\0';
    puts(a);
    return 0;
}
```

```
A. stmwabcd
B. dwcmbtas
C. abcdstmw
D. satbmcwd
```

40) What is the final value of the function call **summation(4)** which is defined as follows?

```c
int summation(int n) {
    int sum = 0;
    if(n == 1)
        return sum;
    else{
        sum = sum + n;
        return summation(n - 1);
     }
}
```

```
A. 0
B. 4
C. 6
D. 10
```

41) What will be printed by the following program?

```c
#include <stdio.h>
#include <string.h>
#define S 100
int main() {
    char s1[S] = "This is an ICS 103 test";
    char s2[6][S]={""}, *token;
    char delim[]=" ";
    int i=5;
    token=strtok(s1,delim);
    while (token != NULL) {
        strcpy(s2[i],token);
        strcat(s2[i],"#");
        i--;
        token=strtok(NULL,delim);
    }
    for(i=0;i<6;i++)
        printf("%s",s2[i]);
    return 0;
}
```

```
A. This#is#an#ICS#103#test
B. tset#301#SCI#na#si#sihT
C. test#103#ICS#an#is#This
D. test#103#ICS#an#is#This#
```

42) Consider the *bubble sort* function. Select the correct order of the elements of the array after each pass to sort the following array: {4, 3, 2, 5, 1}

```
A. {1,4,3,2,5}   {1,2,4,3,5 }   {1,2,3,4,5}   {1,2,3,4,5}
B. {1,3,2,5,4}   {1,2,3,5,4}    {1,2,3,5,4}   {1,2,3,4,5}
C. {3,2,4,1,5}   {2,3,1,4,5}    {2,1,3,4,5}   {1,2,3,4,5}
D. {3,4,2,5,1}   {3,2,4,1,5 }   {2,3,1,4,5 }  {1,2,3,4,5}
```

43) What will be printed by the following program?

```c
#include <stdio.h>
void  func(int a[], int n, int *x1, int *x2);
int main(void){
  int x[]={10,5,20,3,13}, z1, z2;
  func(x,5,&z1,&z2);
  printf("%d %d", z1, z2);
  return 0;
}

void func(int a[], int n, int *x1,int *x2){
  int i;
  *x1 = a[0]; *x2 = a[1];
  for (i = 2; i < n; i++)
    if (a[i] > *x1) {
       *x2 = *x1;   *x1 = a[i];
    } else if (a[i] > *x2)
       *x2 = a[i];
}
```

```
A. 20 10
B. 20 3
C. 13 20
D. 20 13
```

44) Consider the *selection sort* function. Select the correct order of the elements of the array after each pass to sort the following array: {4, 5, 1, 2, 3}

```
A.  {1,5,4,2,3}   {1,2,4,5,3}    {1,2,3,5,4}   {1,2,3,4,5}
B.  {1,4,5,2,3}   {1,2,4,5,3 }   {1,2,3,4,5}   {1,2,3,4,5}
C.  {1,3,2,5,4}   {1,2,3,5,4}    {1,2,3,5,4}   {1,2,3,4,5}
D.  {3,4,2,5,1}   {3,2,4,1,5 }   {2,3,1,4,5 }  {1,2,3,4,5}
```

45) What will be printed by the following program?

```c
#include <stdio.h>
#include <string.h>
void censor(char s[]);
int main(void){
  char x1[]="Welcome to Fortran for All";
  censor(x1);
  puts(x1);
  return 0;
}
void censor(char s[]){
  int i;
  for (i = 0; i< (strlen(s)-2) ; i++)
   if (s[i] == 'f' && s[i+1] == 'o' && s[i+2] =='r')
       {s[i] = '7';  s[i+1] ='7';   s[i+2] = '7';}
}
```

```
A. Welcome to 777tran for All
B. Welcome to Fortran 777 All
C. Welcome to 777tran 777 All
D. WelcometoFortran777All
```

46) What will be printed by the following program?

```c
#include <stdio.h>
#define N 5
int func(int x[], int y, int z);
int main(void){
  int x[N]={2, 7, 5, 10, 3};
  int i;
  printf("%d ", func(x, N, 5));
  for(i=0; i<N; ++i)
     printf("%d ", x[i]);
  return 0;
}

int func(int a[], int s, int z){
  int c = 0, i;
  for(i=0; i<s; ++i)
      if(a[i] > z)
          c = c + a[i];
      else
          a[i] = i;
   return c;
}
```

```
A. 0   0 7 2 10 4
B. 17 2 7 5 10 3
C. 17 0 7 2 10 4
D. 22 0 1 2   3 4
```