MIDDLE EAST TECHNICAL UNIVERSITY
Department of Computer Engineering

CEng 230: Introduction to C Programming

2008 Spring   **FINAL EXAM**   **90 min.**

Surname	Name	Student ID	Grading		
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Part I: Multiple-Choice (60 pts.)
(4 pts. each)

1. What output is produced by the following program?

```
int main()
{   int a=2, b=2, c=2;
    if ((++a > b++) && (b > c))
        printf("sorted");
    else if ((a==b) && (b==c))
        printf("all equal");
    else printf("unsorted");
}
```

a) sorted
b) all equal
c) unsorted
d) no putput is produced

2. What is the output of the following code fragment?

```
int a = 2, k, sum;
while (a<=6){
    for(k=a; k < a+2; k++)
        sum = a+k;
    a = a + 2;
}
printf("a=%d, k=%d, sum=%d\n", a, k, sum);
```

a) a=6, k=7, sum=13
b) a=8, k=7, sum=13
c) a=8, k=8, sum=13
d) a=6, k=8, sum=14

3. What is the output of the following program segment?

```
int x = 1, y = 4;
while (x <= y)
    switch (y % 2) {
        case 0 : x = x + 1;
        case 1 : y = y – 1;
    }
printf("x=%d y=%d\n",x,y);
```

a) x=3 y=1
b) x=5 y=4
c) x=3 y=2
d) x=1 y=4

4. What are the values of the elements in array b, after executing the following segment of code?

```
int a[]={5,1,3,2,4,0};
int b[6] = {0};
int i,j;
for (i=0; i<4; i++){
    j= a[i];
    b[j] = j * 2;
}
```

a) 0,2,4,6,0,10
b) 0,2,4,6,8,10
c) 10,2,4,6,8,0
d) 0,0,0,0,0,0

5. What will be displayed by the statements below?

```
char s1[8] = "petunia",
     s2[9] = "marigold";
char tmp1[10], tmp2[20];
strcpy(tmp2, s1);
strcat(tmp2, s2);
strncpy(tmp1, &tmp2[5], 6);
tmp1[5] = '\0';
printf("%s\n", tmp1);
```

a) iamari
b) iamar
c) oldpet
d) boldpet

6. If the contents of the 2-dimensional array `a` are as follows initially, what will be the new contents of the array after the following nested *for* statement is executed?

1	2	3	4
5	6	7	8
9	0	1	2
3	4	5	6

```
for (i = 0; i < 4; i = i + 1)
    for (j = 0; j < i; j = j + 1) {
        temp = a[i][j];
        a[i][j] = a[j][i];
        a[j][i] = temp;
    }
```

a)

1	2	3	4
5	6	7	8
9	0	1	2
3	4	5	6

b)

1	5	9	3
5	6	0	4
9	0	1	5
3	4	5	6

c)

1	5	9	3
2	6	0	4
3	7	1	5
4	8	2	6

d)

1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

7. What is the output of the following program?

```
void func1(int a[], int *n)
{   *n = a[*n];
    a[*n] = 7;
}
int main()
{   int k[4] = {1, 2, 3, 4}, i=0,x;
    func1(k,&i);
    printf("%d : ", i);
    for (x=0; x<4; x++)
        printf("%d ",k[x]);
}
```

a) `1 : 1 7 3 4`
b) `0 : 1 2 3 4`
c) `1 : 7 2 3 4`
d) `0 : 7 2 3 4`

8. Given the following segment of code, what is the value of string pointed by `ptr1` ?

```
char *ptr1, s1[7] = "Sunday";
char s2[7] = "day";
ptr1 = strncpy(s2,s1,3);
```

a) `"dayday"`
b) `'d'`
c) `'S'`
d) `"Sun"`

9. What is the output of the following program?

```
void m(int a, int *b){
    a = a + 1;
    *b = *b + a;
    printf("a= %d b=%d\n", a, *b);
}
int main(){
    int a=2, b=2;
    m(a,&b);
    printf("a= %d b=%d\n", a, b);
}
```

a) `a=3 b=5`
   `a=3 b=5`
b) `a=3 b=5`
   `a=3 b=2`
c) `a=3 b=5`
   `a=2 b=2`
d) `a=3 b=5`
   `a=2 b=5`

10. If the value of `x` is -35.3271, and the following statement is executed, what value is displayed?
```
printf("%4.2f", x);
```
a) `-35.3271`   **b)** `-35.33`   **c)** `5.33`   **d)** `35.33`

11. What is the value of `x` after executing the following assignment statement?
```
double x;
int y = 1;
x = y/5+ y/(y+1.0);
```
a) `1.0`   **b)** `0.7`   **c)** `0.5`   **d)** `0.0`

A

12. What is the output of the following program?
```
void f(int x[], int y[], int n)
{  int i,t;
    for (i=0; i<n; i++)
        if (x[i] < y[i])
            { t = x[i];   x[i] = y[i]; y[i] = t;}
}
int main()
{  int i, a[4] = {3,6,4,13};
    int b[4] = {6,7,1,2};
    f(a,b,4);
    for (i = 0; i<4; i++) printf("%d ",a[i]);
}
```

a) 6 7 1 2
b) 6 7 4 13
c) 3 6 4 13
d) 3 6 1 2

13. Which one of the following reverses the contents of array x? (N is the number of elements in the array)

a)
```
for (i=0; i<N; i++) {
    temp = x[i];
    x[i] = x[N-i-1];
    x[N-i-1] = temp;     }
```
b)
```
for (i=0; i<N/2; i++) {
    temp = x[i];
    x[i] = x[N-i-1];
```
```
    x[N-i-1] = temp;     }
```
c)
```
for (i=0; i<N; i++) {
    x[i] = x[N-i-1];
    x[N-i-1] = x[i];     }
```
d)
```
for (i=0; i<N/2; i++) {
    x[i] = x[N-i-1];
    x[N-i-1] = x[i];     }
```

14. What does the following code segment do?
```
int i,j;
for (i = 1; i<=10; i++){
    printf("#");
    for (j= 1; j<=10; j++)
        printf("#");
}
```

a) It prints 65 # s.
b) It prints 55 # s.
c) It prints 100 # s
d) It prints 110 # s

15. What is the purpose of the following function?
```
int fun( int item a[], int n) {
    int m = 0;
    for (int i = 1; i < n; i++)
        if (a[i] < a[m]) m = i;
    return(m);
}
```
a) Returns the minimum value in an array of n elements.
b) Returns the number of elements in an array of size n.
c) Returns the maximum value in an array of n elements.
d) Returns the index of the minimum element in an array of n elements.

Part II: Short-Answer Questions (40 pts.)
(8 pts. each)

16. Assume that the following code fragment is supposed to read two double values a and b, such that both values must be forced to be non-zero. That is; entering 0 for both or either values will be rejected and the user is requested to enter a new pair. Write down the missing code (in dots) to achieve this.
```
double a,b;
do
{
    printf("Enter two non-zero values:");

    scanf(...............................);
}

while (.............................................);
```

17. Write down the necessary declarations and a *for*-loop to fill an integer array X of size 100 with numbers 1 to 100.

18. Write down the necessary declarations and a *for*-loop to calculate the value of the series $\sum_{i=1}^{n} i^3$ where

i and *n* are integer numbers.

19. What is the content of array L after the following segment of code is executed?

```
int i=0,j=9,t=6,m, L[10]={1,2,3,4,5,6,7,8,9,10};
while( i <= j){
   m = (i+j)/2;
   if (L[m] < t){
      L[m] = L[m] + 1;
      i = m + 1;
   }
   else if (L[m] > t){
      L[m] = L[m] * 2;
      j = m - 1;
   }
   else L[m] = 0;
}
```

Array L:

20. Write down the outputs of the following program in the boxes provided:

```
#include<stdio.h>

int f1(int a[], int *b, int c, int d)
{      a[*b] = d;
       a[c] = 9;
       c = *b;
       *b = *b/2 + d;
       d = d + 1;
       return *b + c + d;
}
int main()
{      int a[]= {5, 3, 4, 5, 2, 7, 8};
       int b=4, c=1, z, i;

       z = f1(a, &b, a[0], c);

       printf("%d : %d : %d \n", z, b, c);

       for (i = 0; i < 7; i++)
             printf("%d", a[i]);
       printf("\n");
}
```

Answer:

A