Eastern Mediterranean University
Department of Computer Engineering

CMPE 112 Midterm Exam
Spring Semester 2021-2022
April 27, 2022

Name, Surname :…SOLUTION KEY……
Student No :……
Group No :……

Instructors: *Prof. Dr. M. Güler (Grs. 01,02), Prof. Dr. Omar Ramadan (Grs. 03,04)*

Duration: 90 minutes

Instructions:

- The number of pages is 10 in total. Please check !!!!!!
- Calculators are not allowed.
- GSM phones should be turned off.
- A table of operators for precedence and associativity is attached.
- Passing any material including rubbers, pencils etc. to anybody else is strictly prohibited in the exam.
- If an answer box is given in a question, you must give your answer (and nothing else) in the box !!!

Question	Grade
PartI (10 pnts.)	
PartII (20 pnts.)	
PartIII(20 pnts.)	
PartIV(24 pnts.)	
PartV (6 pnts.)	
PartVI(20 pnts.)	
TOTAL: (out of 100)	

PRECEDENCE AND ASSOCIATIVITY

OPERATORS	ASSOCIATIVITY
( ) [ ] -> .	Left to right
! ++ -- + - * & (type) sizeof	Right to left (Unary)
* / %	Left to right
+ -	Left to right
< <= > >=	Left to right
== !=	Left to right
&&	Left to right
||	Left to right
?:	Right to left
= += -= *= /= %=	Right to left
,	Left to right

Part I [10 points]: Multiple choice questions

1) Which of the following is the correct C assignment statement for the formula: *root1* = $\frac{-b + \sqrt{b^2 - 4ac}}{2a}$

A. root1 = (-b + sqrt(b*b - 4*a*c)) / 2*a;
B. root1 = (-b + sqrt(b*b - 4*a*c) / (2*a));
C. root1 = (-b + sqrt(b*b - 4*a*c)) / (2*a);
D. root1 = -b + sqrt(b*b - 4*a*c)/(2*a);

2) Which of the following is a correct implementation of the condition

$10 \leq m \leq 14$

A. (m >= 10 || m <= 14)
B. (10 <= m <= 14)
C. (m >= 10 && <= 14)
D. (m >= 10 && m <= 14)

3) What will be the output of the following C code fragment?

```
double x = 3.456;
printf("%4.1f*%5.2f*%.4f\n", x, x, x);
```

A.		3	.	4	*		3	.	4	5	*	3	.	4	5	6	0
B.		3	.	5	*		3	.	4	6	*	3	.	4	5	6	0
C.		3	.	5	*	3	.	4	6	*	3	.	4	5	6	0	
D.		3	.	4	*	3	.	4	5	*	3	.	4	5	6	0	

4) What will be the output of the following C code fragment?

```
int x = 345;
printf("%4d*%5d*%1d\n", x, x, x);
```

A.		3	4	5	*			3	4	5	*	3	4	5		
B.		3	4	5	*			3	4	5	*	3				
C.		3	4	5		*			3	4	5		*	3		
D.	3	4	5		*	3	4	5			*	3	4	5		

5) What will be the output of the following code fragment?

```
printf("%f\n ",((int) (3.141592*1000))/1000.0);
```

A. 3.141592
B. 3.141000
C. 3.142000
D. 3.000000

Part II [20 points]: What will be the outputs of the following programs?

A)

```
#include <stdio.h>
int main(void)
{
   int x= 7, y = 4,z;
   printf("%d\n",x--);
   z= --x * y++;
   printf("%d \n", z);
   return 0;
}
```

Output

7

20

B)

```
#include <stdio.h>
int main() {
   int x;
   printf("Enter a value for x >");
   scanf("%d",&x);

   if(x >= 6 )
   if(x < 10)
   if(x > 7)
   printf("A");
   else
   printf("C");
   else
   if ( x > 12)
   printf("D");
   else
   printf("B");
   else
   printf("F");

   return 0;
}
```

Value of x typed by user	Program output
15	**D**
7	**C**
3	**F**

C)

```
#include <stdio.h> // 3 points
int main() {
  int y;
  scanf("%d",&y);
  switch(y){
          case 7: y=y+1;
          case 3: y=y+2;
                  break;
          case 2: y=y+3;
          default: y=y+4;
  }
   printf("%d\n",y);
  return 0;
}
```

Value of y typed by user	Program output
7	**10**
2	**9**
4	**8**

D)

```
#include <stdio.h>

int main(void)
{
    int i, j, sum;


        sum = 0;
        for(j=0; j<7; j++) {
            if(j%2==0 || j%3==0)
                continue;
            sum += j*j;
     if(sum>5)
       break;
        }
        printf("%d %d\n", j, sum);

    return 0;
}
```

Output

---

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Part III [20 points]

Complete the following C program that will take from the user, in the main function, two real numbers (a, b) and one operator (op) (‘+’, ‘-’, ‘/’, or ‘*’). The C code contains a function called “ComputeResult” that will return to the main function the result of the operation. The function prototype is double ComputeResult(double, double, char);
The function to be written is required to compute the result of the operation using switch statement. This result should be displayed in the main function as shown in the sample runs.

Sample run 1
Enter a op b: 10.5 * 9 10.5*3.9 = 40.95

Sample run 2
Enter a op b: 4.5 / 0 Error cannot divide 0

Sample run 3
Enter a op b: 12.5 $ 3.45 $ is unknown operation

```
#include <stdio.h>
double ComputeResult (double, double, char);          // function prototype
int main(){
  double a,b,result;
  char   op;
  printf("Enter operation, a op b : ");
  scanf("%lf %c %lf",&a,&op,&b);

  if(op=='/' && b==0  )
    printf("Error cannot divide by 0\n");

  else if (op == '*' || op == '+' || op == '-' || op == '/')
{
    result = operation(a,b,op);    // Call the function to compute the result
    printf("%.2f %c %.2f = %.2f \n",a,op,b,result);
  }
  else      printf("%c is unknown operation\n", op);
  return 0;}
// define the function ComputeResult. Use switch statement
double operation(double a, double b, char op){
          double result;
          switch(op){
                    case '*': result=a*b;
                              break;
                    case '+': result=a+b;
                              break;
                    case '-': result=a-b;
                              break;
                    case '/': result=a/b;      }
          return result;}
```

Part IV [24 points]

Assuming that **int i = 2, j = 4, k = 9;** is given **before each** one of the following expressions, evaluate **the value of each expression (exp)** and also give **new values of i, j, and k** after each expression. **Note that your answers must be given in the table below**.

1. **i += j != k**
2. **k = ++j+i++**
3. **!j<i**
4. **++i==j--**
5. **k-j*2>=i?j:++k**
6. **i=j>=k**
7. **(i-=2)&&++j**
8. **--i||++j**
9. **i&&(k -= 9)**
10. **j < i <k**
11. **i = (k = j++, k += j)**
12. **!!k > 4?++j:i++**

	exp	i	j	k
1	3	3	4	**9**
2	7	3	5	7
3	1	2	4	**9**
4	0	3	3	**9**
5	10	2	4	10
6	0	0	**4**	**9**
7	0	0	4	**9**
8	1	1	4	**9**
9	0	2	4	0
10	1	2	4	**9**
11	9	9	5	9
12	2	3	4	9

Part V [6 points]

Give the output of the following program:

```
#include <stdio.h>
main()
{
  int i, j, k;
  float x;

  i = 11; j = 4; k = i/j;
  printf("%d\n", k);

  x = i/j + 2.5;
  printf("%4.2f\n", x);

  k = i/j + 2.5;
  printf("%d\n", k);

  k = (float)i/j + 2.5;
  printf("%d\n", k);

   x = (float)i/j + 2.5;
   printf("%4.2f\n", x);

   x = (float)(i/j) + 2.5;
   printf("%4.2f\n", x);
}
```

```
2
4.50
4
5
5.25
4.50
```

Part VI [20 points]

Give the outputs of the following programs:

1.)

```
#include <stdio.h>

 int main()
  {
     void fun(int);
     int x=5;

     fun(x);

     printf("%d\n", x);
  }

  void fun(int x)
  {
     x += 7;
     printf("%d\n", x);
  }
```

12
5

2.)

```
#include <stdio.h>

main()
{
  int i=2,k=18;

  for(;i<10;i++)
  {
    static int k=10;
    if(k%i==0) printf("i");
  }
  printf("%d %d\n",i,k);
}
```

ii10 18

3.)

```
#include <stdio.h>

main()
{
  int i = 7, j = -2;

  while(i++, j += 3, i>j+1)
      printf("i=%d j=%d\n", i, j);
}
```

i=8 j=1
i=9 j=4
i=10 j=7

4.)

```
#include<stdio.h>
main()
{
  int j, k, a;

 for(a=0, j=0, k=3; j<k; j+=2, k++) a += j+k;

 printf("a=%d j=%d k=%d\n", a, j, k);

 for(a=0, j=0, k=3; j<k; j+=2, k++)
 {
  a += j+k;
  if(j+k == 6) break;
 }

 printf("a=%d\n", a);

 for(a=0, j=0, k=3; j<k; j+=2, k++)
 {
  if(j%k == 2) continue;
  a += j+k;
 }

 printf("a=%d\n", a);
}
```

```
a= 18  j= 6 k= 6
a= 9
a= 12
```