Eastern Mediterranean University
Department of Computer Engineering

CMPE 108 – Algorithms and Programming
Midterm Exam, 2021-2022 Spring Semester
April 26, 2022
Duration: 90 minutes

Name Surname: .....SOLUTION.....

Student No : ..... **Signature** :.....

Instructions:

There are **5** questions in **7** pages including the cover page.
Calculators, mobile phones and any electronic devices are **NOT** allowed.
A table of operators for precedence and associativity is attached on Cover Page.
Passing any material including rubbers, pencils etc. to anybody else is strictly prohibited in the exam.
Asking questions to invigilators is prohibited. The instructors will visit the exam rooms regularly.

Q1 (7 pts)	Q2 (24pts)	Q3 (29 pts)	Q4 (20 pts)	Q5 (20 pts)	Total

PRECEDENCE AND ASSOCIATIVITY TABLE

Operators	Associativity
( ) [ ] -> .	Left to right
! ++ -- + - * & (type)	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

% specifiers in ANSI C:

%c char single character	%o int unsigned octal value
%d (%i) int signed integer	%p pointer address stored in pointer
%e (%E) float or double exponential format	%s array of char sequence of characters
%f float or double signed decimal	%u int unsigned decimal
%g (%G) float or double use %f or %e as required	%x (%X) int unsigned hex value

Q1) [7 pts] Multiple choice questions. Circle the correct answer.

i) Which of the following is <u>not</u> a kind of memory?

a) RAM
b) ROM
c) Cache
d) Central Processing Unit

ii) Which of the following is a correct abbreviation for ROM?

a) Raw Overflow Matrix
b) Read Only Memory
c) Row Only Memory
d) Read Only Machine

iii) Which of the following is a correct statement?

a) The smallest data inside a computer is called a byte
b) The largest data inside a computer is called giga byte
c) The largest data item inside a computer is called mega byte
d) The smallest data inside a computer is called a bit

iv) Which of the following is <u>not</u> an operating system?

a) Windows
b) GHz
c) Mac OS X
d) Linux

v) Which of the following is <u>not</u> an output device?

a) Monitor
b) Speaker
c) Earphones
d) Microphone

vi) Which of the following is <u>not</u> an input device?

a) Digital camera
b) Mouse
c) Printer
d) Scanner

vii) Which of the following is a correct statement?

a) A computer performs four major functions such as input, output, processing and storage
b) RAM type memory provides permanent storage regardless of electricity cut
c) The software components of a computer are electronic and physical parts
d) The hardware components of a computer are data and computer programs

Q2) Determine the output of the following C program segments.

a) [3 pts] What is the value of k?

```
int i, j, k;
i = 3;
j = 5;
k = i > j ? i : j;
```

k= .....5.....

b) [3 pts] What is the value of k?

```
int i, j, k;
i = 3;
j = 5;
k = (i >= 0 ? i : 0) + j;
```

k= .....8.....

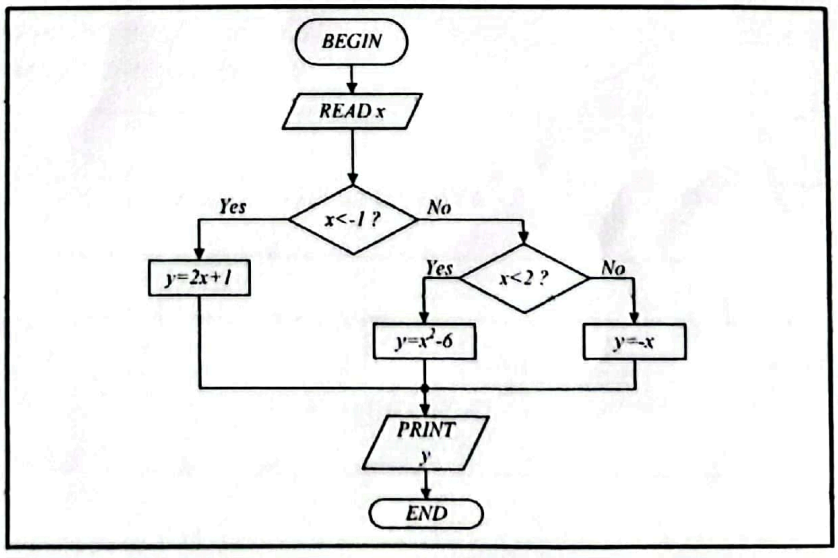
c) [8 pts] Determine the output of the following C program for age=65.

```
int age, age1=25, age2=45, age3=65, age4=85;
printf("Enter your age: ");
scanf("%d", &age);
if (age<age1)
     printf("You are very young\n");
else if (age<age2)
     printf("You are young\n");
else if (age<age3)
     printf("You are not that old\n");
else
     printf("You are old\n");
```

Output: You are old

d) [10 pts] Consider the following funtion. Draw a flowchart to <u>calculate</u> and <u>display</u> the value of *y*. Assume that the value of *x* is read via keyboard.

$$y=\begin{cases} 2x+1 \ , & x<-1 \\ x^2-6 \ , & -1\le x<2 \\ -x \ , & x\ge 2 \end{cases}$$



Q3) a) [5 pts] State which of the following C identifier names are valid or invalid. Give reason if invalid.

Identifier	Valid/Invalid	Reason
Step#1	Invalid	Includes # character
7th_Street	Invalid	Starts with a number
DeValuation	Valid	
next_level	Valid	
Radius1	Valid	

b) [8 pts] Write down the <u>equivalent mathematical expression</u> for each C expression shown below.

i) `m=(8*n*n/7)/(1/3+n)`

$$m=\frac{\frac{8n^2}{7}}{\frac{1}{3}+n}$$

ii) `c=(a+b)/a*b-b/7`

$$c=\frac{a+b}{ab}-\frac{b}{7}$$

c) [8 pts] Without using unnecessary paranthesis, write down the equivalent C expression for each mathematical expression shown below.

i) c=5b(a – 8b) + 4a–2

```
c=5*b*(a-8*b)+4*a-2
```

ii) $y=\frac{\frac{4x^2}{3}}{6x+7}+8x^3$

```
y=(4*x*x/3)/(6*x+7)+8*x*x*x
```

d) [8 pts] For the following display outputs fill in the blanks of the printf statements to get the output exacly as given below.

```
int a=21, b=5;
float c=68.27, d=0.002183;
```

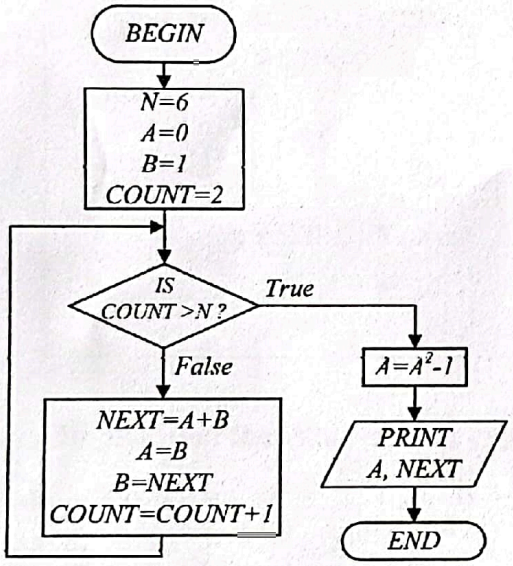
a) `printf("%-3d%5d",a,b);` | 2 | 1 | . | | | | | 5 | | | | | | | | | |

b) `printf("%8.2e",d);` | 2 | . | 1 | 8 | e | - | 0 | 3 | | | | | | | | | |

c) `printf("%6.3f",c);` | 6 | 8 | . | 2 | 7 | 0 | | | | | | | | | | | |

d) `printf("%d%f",b,c);` | 5 | 6 | 8 | . | 2 | 7 | 0 | 0 | 0 | 0 | | | | | | | |

Q4) [20 pts] Trace the following flowchart. Record all steps into the trace table and determine the printed value of SNUM.



Trace Table:

N	NEXT	A	B	COUNT
6		0	1	2
	1	1	1	3
	2	1	2	4
	3	2	3	5
	5	3	5	6
	8	5	8	7
		24		

A=.....24.....

NEXT=....8.....

Q5) a) [10 pts] What is the output of the following code for each input?

```
int X, Y=27;
printf("Enter a value for X >0");
scanf("%d", &X);
switch(X)
{
 case 0:
        printf("Pass\n");
        break;
 case 1:
        X=Y%12;
        printf("%d\n",X);
        break;
 case 2:
        printf("%d\n",X+Y);
        break;
 case 3:
 case 4:
         printf("Stop");
         break;
 case 5:
        Y/=2;
 default:
        ++X;
        printf("%d\n",Y-X);
}
```

Input (X)	Output
0	Pass
1	3
2	29
3	Stop
5	7

b) [10 pts] Find the value of each expression shown below.

```
double  a = 1.0,  b = 2.4, c;
int i = 2, j = 3, k = 1, m;
```

	Expression	Value
1	k+=i-1	2
2	m=i/j	0
3	j*=i-k	3
4	i*j%5	1
5	k=k+i++	3
6	j>i>k	False(0)

7	`i>j||j>=k`	True (1)
8	`m=2*b/-a`	-4
9	`c=++k`	**2.0**
10	`c=(2*a)*(6%10-b/2)`	**9.6**