



Eastern Mediterranean University
Department of Computer Engineering

CMPE 108 – Algorithms and Programming
Midterm Exam, 2022-2023 Fall Semester
November 26, 2022
Duration: 90 minutes

Name Surname:

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 (26pts)	Q3 (29 pts)	Q4 (21 pts)	Q5 (17 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 a kind of memory?**
- a) Random Number Generator
 - b) ROM**
 - c) Arithmetic Logic Unit
 - d) Central Processing Unit
- ii) Which of the following is a correct abbreviation for RAM?**
- a) Raw Array Matrix
 - b) Read Array Memory
 - c) Random Access Memory**
 - d) Read Access Memory
- iii) Which of the following is not a correct statement?**
- a) An 8-bit data inside a computer is called a byte
 - b) 1 Mega byte is equal to 10000 bytes**
 - c) Binary numbering system is used by the computers
 - d) The smallest data inside a computer is called a bit
- iv) Which of the following is an operating system?**
- a) Windows**
 - b) GHz
 - c) Doors
 - d) ASCII
- v) Which of the following is an output device?**
- a) Motherboard
 - b) Speaker**
 - c) USB
 - d) Microphone
- vi) Which of the following is an input device?**
- a) Monitor
 - b) Keyboard**
 - c) Printer
 - d) Hard disk drive
- vii) Which of the following is not a correct statement?**
- a) A computer only performs two major functions such as input and storage**
 - b) ROM type memory provides permanent storage regardless of electricity cut
 - c) The software components of a computer are data and computer programs
 - d) The hardware components of a computer are electronic and physical parts

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

a) [2 pts] What is the value of c?

```
int a, b, c;
a = 4;
b = 6;
c = a++ + b++;
```

c=10.....

b) [4 pts] What are the values of a and d?

```
int a, b=2, c;
float d=0.3;
a = b+3+d;
d = 5+b;
```

a=5.....

d=7.0.....

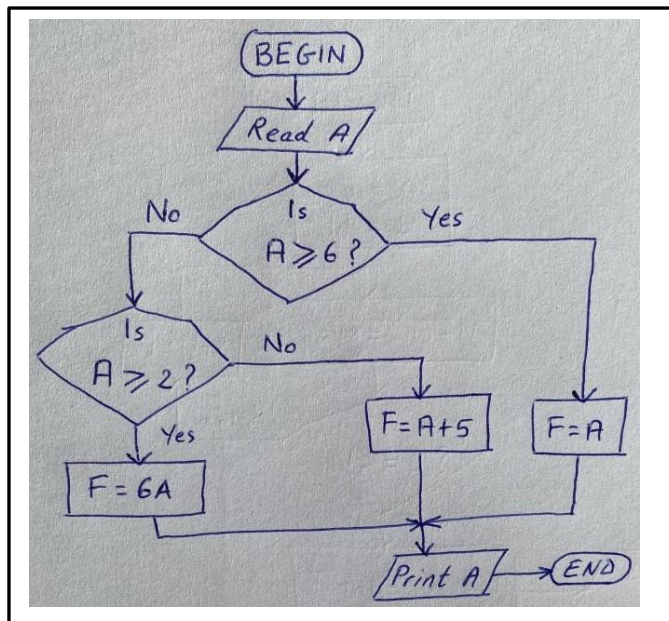
c) [10 pts] Determine the output of the following C program for final=60.

```
int midterm=80, lab=8, hw1=7, hw2=6, ave, final;
printf("Enter your final grade: ");
scanf("%d", &final);
ave=(midterm+final)/2+hw1+hw2;
if (ave<50)
    printf("You are not successful with %d\n",ave);
else if (ave<65 && lab>5)
    printf("Satisfactory in programming and lab\n");
else if (ave<75 || lab>7)
    printf("Absolutely satisfactory with %d\n",ave);
else
    printf("You are excellent in programming and lab\n");
```

Output: Absolutely satisfactory with 83

d) [10 pts] Consider the following funtion. Draw a flowchart to calculate and display the value of F. Assume that the value of A is read via keyboard.

$$F = \begin{cases} A & , A \geq 6 \\ 6A & , 2 \leq A < 6 \\ A+5 & , A < 2 \end{cases}$$



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

Identifier	Valid/Invalid	Reason
Why?	Invalid	It contains special character ?
7th-Avenue	Invalid	It starts with 7 and contains -
InFLA_tion	Valid	
_Bonus	Valid	
TempERATURE1	Valid	

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

i) $y = 8 * x * x / 7 / (3 / 5 + x)$

$$y = \frac{8x^2}{\frac{7}{\frac{3}{5} + x}}$$

ii) $w = (x + y - z / x) / 2 * x * y * z + 4 / x$

$$w = \frac{(x + y - \frac{z}{x})}{2} * xyz + \frac{4}{x}$$

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

i) $y = \frac{\frac{3x^2}{4} + \frac{a}{2}}{\frac{5}{6x} + 7} - \frac{1}{a}$

$$y = (3 * x * x / 4 + a / 2) / (5 / (6 * x) + 7) - 1 / a$$

ii) $g = \frac{a}{4bc + \frac{5}{7a}}$

$$g = a / (4 * b * c + 5 / (7 * a))$$

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

```
int a=123, b=45;
float c=27.3651, d=3682.091;
```

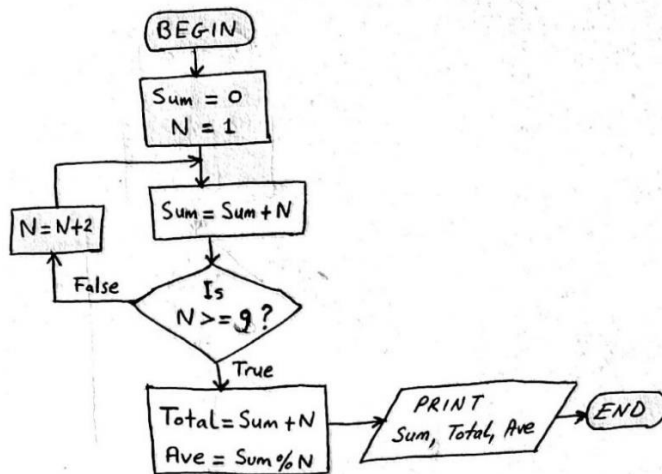
a) printf("%-3d%2d", a, b); 1 2 3 4 5

b) printf("%12.6e", d); 3 . 6 8 2 0 9 1 e + 0 3

c) printf("%8.5f", c); 2 7 . 3 6 5 1 0

d) printf("%d%f", b, c); 4 5 2 7 . 3 6 5 1 0 0

Q4) [21 pts] Trace the following flowchart. Record all steps into the trace table and determine the printed values of Sum, Total and Ave.



Trace Table:

Sum	N	Total	Ave
0	1		
1			
	3		
4			
	5		
9			
	7		
16			
	9		
25			
		34	7

Sum=...25..

Total=...34..

Ave=...7....

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

<pre> int K, M=27, N=5; printf("Enter a value for K >0"); scanf("%d", &K); switch(K) { case 0: printf("%d\n", ++M); break; case 1: K+=5; printf("%d\n", K+N); break; case 2: printf("%d\n", N*K); break; case 3: case 4: printf("Good"); break; case 5: M/=2; default: K*=2; printf("%d\n", M-K); } </pre>	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Input (K)</th> <th style="padding: 5px;">Output</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">0</td> <td style="text-align: center; padding: 5px;">28</td> </tr> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">11</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">10</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">Good</td> </tr> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">3</td> </tr> </tbody> </table>	Input (K)	Output	0	28	1	11	2	10	3	Good	5	3
Input (K)	Output												
0	28												
1	11												
2	10												
3	Good												
5	3												

b) [7 pts] Find the value of each expression shown below.

double a = 2.0, b = 6.4;

int i = 4, j = 3, k = 2;

	Expression	Value
1	i+j*k	10
2	i-j-k	-1
3	j*=i	12
4	i*j%k	0
5	a*k*i-b+a/k	10.6
6	i>j>k	0
7	i>j j>=k	1