



Eastern Mediterranean University  
Department of Computer Engineering

**CMPE 108 – Algorithms and  
Programming Midterm Exam, 2021-2022 Fall  
Semester  
November 25, 2021  
Duration: 100 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 (10 pts)	Q2 (15pts)	Q3 (35 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 %d (%i) int signed integer %e (%E) float or double exponential format %f float or double signed decimal %g (%G) float or double use %f or %e as required	%o int unsigned octal value %p pointer address stored in pointer %s array of char sequence of characters %u int unsigned decimal %x (%X) int unsigned hex value
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**Q1) [10 pts] Multiple choice questions. Circle the correct answer.**

- i) Which of the following is a correct statement for an input device?**
- a) **Input device allows entering data**
  - b) Input device calculates data
  - c) Input device displays data
  - d) Input device saves data
- ii) Which of the following is a correct statement for an output device?**
- a) Output device allows entering data
  - b) Output device calculates data
  - c) **Output device displays data**
  - d) Output device saves data
- iii) Which of the following numbering system is used inside a computer?**
- a) Hexadecimal numbering system
  - b) **Binary numbering system**
  - c) Decimal numbering system
  - d) Octal numbering system
- iv) Which of the following is an operating system?**
- a) **Windows**
  - b) RAM
  - c) CPU
  - d) GHz
- v) Which of the following devices is an output device?**
- a) Scanner
  - b) Digital camera
  - c) **Earphones**
  - d) Microphone
- vi) Which of the following devices is an input device?**
- a) Monitor
  - b) **Mouse**
  - c) Printer
  - d) Speaker
- vii) Which of the following is a correct statement?**
- a) **A computer consists of both hardware and software**
  - b) ROM type memory is a temporary storage,
  - c) The software components of a computer are electronic and physical parts
  - d) The hardware components of a computer are data and computer programs

viii) Which of the following is correct?

- a) A motherboard of a computer contains keyboard
- b) A motherboard of a computer contains monitor
- c) A motherboard of a computer contains memory units such as RAM and ROM
- d) A motherboard of a computer contains mouse.

ix) Which of the following is correct?

- a) 10GB=1KB
- b) 1KB=10MB
- c) 1MB=100GB
- d) 1GB=1000MB

x) Which of the following belongs to central processing unit (CPU)?

- a) Read only memory (ROM)
- b) Microphone
- c) Arithmetic logic unit (ALU)
- d) Scanner

Q2) Determine the output of the following C program segments

a) [10 pts]

```
int result;
int x=45, y=27, z=39;
{
if (x<= y)
{
if (y<=z)
result=y;
else if (x<=z)
result=z;
else
result=x;
}
}
else
{
if (z<=y)
result=y;
else if (x<=z)
result=x;
else
result=z;
}
```

Output: ..Median of 45, 27, and 39 is 39.....

```
printf("Median of %d, %d, and %d is %d\n", x,y,z,result);
```

b) [5 pts]

```
float x=5.0;
int y=25;
if (x >= (y-20))
    y=x*10;
else
    y=y/2;
```

**Output:** y=.....50.....

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

Identifier	Valid/Invalid	Reason
NeXt	valid	
Cmpe_108	valid	
20_Euros	invalid	identifier cannot start with a number
_LeVEL	valid	
ab&	invalid	identifier cannot contain special symbol

b) [10 pts] Write down the equivalent mathematical expression for each C expression shown below.

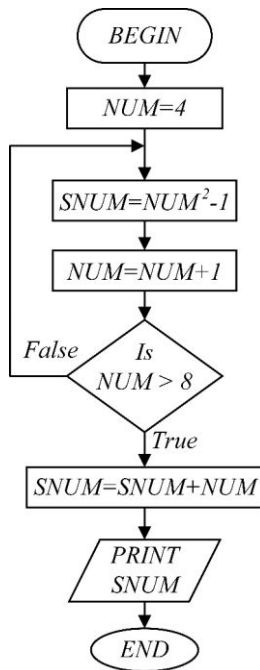
i)  $2*n*n*n - 4*n*n + 3*n + 1$

$$2n^3 - 4n^2 + 3n + 1$$

ii)  $(a*a - b*b)/(a-b) + 1/a + 2*b$

$$\frac{a^2 - b^2}{a - b} + \frac{1}{a} + 2b$$





Trace Table:

Step	NUM	SNUM
<b>1</b>	<b>4</b>	<b>15</b>
	<b>5</b>	
<b>2</b>		<b>24</b>
	<b>6</b>	
<b>3</b>		<b>35</b>
	<b>7</b>	
<b>4</b>		<b>48</b>
	<b>8</b>	
<b>5</b>		<b>63</b>
	<b>9</b>	
		<b>72</b>

**SNUM=...72.....**

Q5) a) [10 pts] Give the outputs of the following two code fragments.

```

int N, K=0;
printf("Enter a value for N >0");
scanf("%d", &N);
switch(N)
{
case 0:
    printf("%d\n",8);
    break;
case 1:
    N+=1;
case 2:
    printf("%d\n",N);
    break;
case 3:
case 4:
    printf("OK");
    break;
case 5:
    N*=2;
default :
    K=K+1;
    printf("%d\n",N+K);
}
  
```

Input (N)	Output
<b>0</b>	<b>8</b>
<b>1</b>	<b>2</b>
<b>2</b>	<b>2</b>
<b>3</b>	<b>OK</b>
<b>5</b>	<b>11</b>

b) [10 pts] Assuming that

`double a = 1.0, b = 2.0;`

`int i = 2, j = 3, k = 1, m;`

find the value of each expression shown below.

#	Expression	Value
1	<code>k*=3-i/j+2</code>	5
2	<code>b / k / a</code>	2.0
3	<code>!j &gt; 1</code>	0
4	<code>7*j%8</code>	5
5	<code>m=i-j++</code>	-1
6	<code>i&gt;=j    k != 1</code>	0
7	<code>k &lt;= i == j &gt;= k</code>	1
8	<code>j += j - 1</code>	5
9	<code>i * = k + j</code>	8
10	<code>m = a + k + i</code>	4