

**King Saud University**  
College of Computer and Information Sciences  
Computer Science Department



Course Code	CSC 215				
Course Title	Procedural Programming				
Section No.					
Semester	Fall 2023				
Exam	Midterm Exam 1				
Date	10/01/2023	Duration	75 minutes		
Student Name	[REDACTED]				
Student ID	[REDACTED]				
		Relevant question	Full mark	Student mark	
CLO 1	Apply knowledge of computing and mathematics appropriate to the discipline.	1	10	8	
CLO 2	Analyze a problem, and identify and define the computing requirements appropriate to its solution	2	5	4	
		3	5	5	
CLO 3	Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs.	4	5	3	
CLO 4	Use current techniques, skills, and tools necessary for computing practice.			20	
Feedback/Comments:					

For all questions, assume the size of the integer type and the addresses is 32-bits.  
Assume standard library header files are include where needed.

Question 1: Copy your answer for each of the following questions to the table:

1	2	3	4	5	6	7	8	9	10
C	A	D	B	D	A	C	D	D	A

1. What is the result of logical or relational expression in C?  
 A. True or False  
 B. 0 or 1  
 C. 0 for false expressions, non-zero value otherwise  
 D. None of the given

2. What will be the output of the following C code?

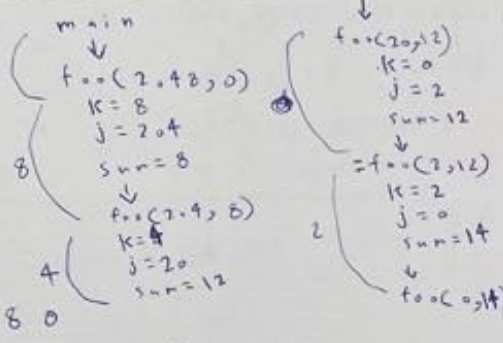
```
int main() {
    int y = 10000;
    int y = 34;
    printf("Hello World! %d\n", y);
    return 0;
}
```

- A. Compile time error  
 B. Hello World! 34  
 C. Hello World! 1000  
 D. Hello World! followed by a junk value

3. What is the output of the following program?

```
void foo(int n, int sum) {
    int k = 0, j = 0;
    if (n == 0) return;
    k = n % 10;
    j = n / 10;
    sum = sum + k;
    foo(j, sum);
    printf("%d", k);
}

int main() {
    int a = 2048, sum = 0;
    foo(a, sum);
    printf("%d", sum);
    return 0;
}
```



- A. 8, 4, 0, 2, 14  
 B. 8, 4, 0, 2, 0  
 C. 2, 0, 4, 8, 14  
 D. 2, 0, 4, 8, 0

4. What will be the output of the following C code?

```
int main() {
    signed char chr;
    chr = 128;
    printf("%d\n", chr);
    return 0;
}
```

- A. 128  
 B. -128  
 C. Undefined  
 D. None of the given

5. Which expression, when placed in the blank, will NOT result in a type checking error?

```
void f(int, short);
void main() {
    int i = 100;
    short s = 12, *p = &s;
    _____; // call to f()
}
```

P → 5  
128

- A. f(s, \*s)  
 B. i = f(i, s)  
 C. f(i, \*s)  
 D. f(i, \*p)

6. What is the output of the following program?

```
void f1(int a, int b){
    int c=a; a=b; b=c; c=4
}
void f2(int a, int b){
    int c=a; *a=b; *b=c;
    c=5 b=5
}
int main(){
    int a=4, b=5, c=6;
    f1(a, b);
    f2(&b, &c);
    printf("%d", c-a-b);
    return 0;
}
```

A. -5

B. -4

C. 5

D. 3

7. What is the output of the following program?

```
int f(int n, int k){
    if (n == 0) return 0;
    else if (n % 2) return f(n/2, 2*k) + k;
    else return f(n/2, 2*k) - k;
}
int main(){
    printf("%d", f(20, 1));
    return 0;
}
```

A. 5

B. 8

C. 9

D. 20

$f(10, 2) = 1 - 1 = 0$   
 $\downarrow$   
 $f(5, 4) - 2 = 12 - 2 = 10$   
 $\downarrow$   
 $f(2, 8) + 4 = 8 + 4 = 12$   
 $\downarrow$   
 $f(1, 16) - 8 = 16 - 8 = 8$   
 $\downarrow$   
 $f(0, 32) + 16 = 0 + 16 = 16$

8. What is the output of the following program?

```
int fun(){
    static int num = 16;
    return num--;
}
int main(){
    for(fun(); fun(); fun())
        printf("%d ", fun());
    return 0;
}
```

A. Infinite loop

B. 13 10 7 4 1

C. 15 12 8 5 2

D. 14 11 8 5 2

$n = 16$  14 13

9. What is the output of the following program?

```
int main(){
    int i = 0;
    do{
        i++;
        if (i == 2) continue;
        printf("In while loop ");
    } while (i < 2);
    printf("%d\n", i);
    return 0;
}
```

A. Infinite loop

B. In while loop 2

C. In while loop 3

D. In while loop In while loop 3

$i = 0 \times 2$

10. What is the value returned when calling the following function using func(435)?

```
int func(int num) {
    int count = 0;
    while(num) {
        count++;
        num >>= 1;
    }
    return(count);
}
```

Handwritten calculation for func(435):

256	128	64	32	16	8	4	2	1
1	1	0	1	1	0	0	1	1
0	1	1	0	1	1	0	0	1
0	0	1	1	0	1	1	0	0
0	0	0	1	1	0	1	1	0

Count of 1s = 10

- (A) 9      B. 8      C. 0      D. 10

Question 2: Given the following Program, answer the questions. (5 Marks)

```
int main() {
    int j=0;
    char str[8] = {'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H'};
    for(i='A'; i<='H'; i++) {
        *(str+j++)=i;
        if (j==6) break;
    }
    return 0;
}
```

Handwritten diagram showing memory layout:

j = 0	x	2	3	4	5	6
i = 'A'	B	C	D	E	F	G

A. Complete the memory state below, where the first element is given:

Address	0x470	0x471	0x472	0x473	0x474	0x475	0x476	0x477
Content	'A'	B	C	D	E	F	G	H

B. Write (a) statement(s) to declare and initialize the pointer ptrs and make it point to the 4<sup>th</sup> element in the array str (points to 'D').

Handwritten code: `char *ptrs; ptrs = str + 3;`

C. What is the value of each of the following expressions?

strlen(ptrs)	3
ptrs - str	3
*(ptrs+3)	G
*ptrs++	A

D. Write a single output statement that prints out the string str using the pointer ptrs.

Handwritten code: `printf("%s", ptrs);`

Question 3: Answer the following questions: (5 Marks)

A. What are the values of x, y and z after executing following statements?

Handwritten calculations:

```
int x=8, y=6;
x *= 3 - (-5y)/3;
x = 16, y = 5
```

```
int x=2, y=4, z=5;
x *= (11>1) - (y++) + (z<1);
x = 24, y = 4, z = 5
```

Handwritten calculation for Question 3A:

16	8	4	2	1
0	1	0	1	1
0	0	1	0	1
0	0	1	0	1
0	1	0	1	0

Count of 1s = 5



Question 4: Write a function last\_word\_length that takes a sentence as a string parameter, and returns the length of the last word of the sentence. (5 Marks)

Note: the sentence contains letters and one space between each two consecutive words. No spaces occur at the beginning or at the end of the sentence.

```
int last_word_length(char s){
```

```
    int count = 0;
```

```
    for (int i = 0; i < strlen(s); i++)  
    if (s[i] != ' ')  
    count++;  
    count--;
```

```
    int i;  
    for (i = 0; i < strlen(s); i++) {  
        if (s[i] == ' '){  
            count = 0;  
            continue;  
        }  
        count++;
```

```
    }  
    return count;
```

```
}
```

FA-REV