

Indian Institute of Technology Kharagpur		
Department of Computer Science and Engineering		
CS10003 : Programming and Data Structures (Theory)		
Autumn 2020	Short Test 1 (ALL Q&A)	Marks: 20
Date: 23-Dec-2020 (Wednesday)   Time: 10:00pm-10:25pm (25 min)		

Instruction: Share with ONLY Instructors and TAs.

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+++++++ Topic-1 ++++++

Question - 1.1:

Which of the following is/are NOT legal name(s) of a C variable?

- (A) \_12name
- (B) 12\_name
- (C) name\_12
- (D) name12\_

Answer - 1.1:

- (B) 12\_name

Question - 1.2:

Which of the following is/are NOT valid data-type(s) in C?

- (A) unsigned long int
- (B) long long int
- (C) long double
- (D) unsigned double

Answer - 1.2:

- (D) unsigned double

Question - 1.3:

Which of the following is/are not a legal floating-point constant(s) in C?

- (A) +123.456
- (B) -123456.
- (C) +1.23e+456
- (D) -1.23e-45.6

Answer - 1.3:

- (D) -1.23e-45.6

+++++++ Topic-2 ++++++

Question – 2.1:

Assume that a and b are integer variables and x is a floating-point variable holding the values 3, 6 and 4.5 respectively. Which of the following expressions is/are evaluated as TRUE?

- (A)  $(a*b > x*x)$
- (B)  $(a*b > (int)x*x)$
- (C)  $(a*b > (int)(x*x))$
- (D)  $(a*b > (int)x*(int)x)$

Answer – 2.1:

- (D)  $(a*b > (int)x*(int)x)$

Question – 2.2:

Assume that the integer variables a, b and c store the values 7, 4 and -2 respectively. At that instance, the following statement is executed:

$a = a - a \% b * c;$

What value is assigned to the variable a?

Answer – 2.2:

13

Question – 2.3:

Which of the following logical expressions is/are equivalent to the expression  $!(x \leq y) \&\&(y \leq z)$ ? (x, y and z are variables)

- (A)  $((x > y) \&\&(y > z))$
- (B)  $((x > y) || (y > z))$
- (C)  $!(x \leq z)$
- (D)  $(x \geq z)$

Answer – 2.3:

- (B)  $((x > y) || (y > z))$

+++++++ Topic-3 ++++++

Question – 3.1:

Suppose that, the integer variables a, b, c and d hold the values 5, 3, 5 and 9 respectively. At that moment, the following C code snippet (x, y, z are uninitialized integer variables) is executed:

```
if (a > b) x = a; else x = b;
if (c > d) y = c; else y = d;
if (x > y) z = x; else z = y;
```

What will be the value for z after you successfully run this code snippet?

Answer – 3.1:

9

Question – 3.2:

Suppose that, the integer variables a, b, and c hold the values 5, 3, and 4 respectively. Then, the following C code snippet is executed:

```
if ( (a<b) || (c<b) ) printf("A");
else if ( (c<a) && (c<b) ) printf("B");
else if ( (a<b) < c ) printf("C");
else if ( !(a+b>c) ) printf("D");
else printf("X");
```

What will be printed in the output if you successfully run this code snippet?

Answer – 3.2:

C

Question – 3.3:

Suppose that, the integer variable i holds the value 7. Then, the following C code snippet is executed:

```
switch(i)
{
    case 9: printf("U"); break;
    case 8: printf("G");
    case 7: printf("C");
    case 6: printf("S");
    case 5: printf("1");
    case 4: printf("0");
    case 3: printf("0");
    case 2: printf("0");
    case 1: printf("3"); break;
    case 0: printf("2020");
    default: printf("Autumn"); break;
}
```

What will be printed in the output if you successfully run this code snippet?

Answer – 3.3:

CS10003

+++++++ Topic-4 ++++++

Question – 4.1:

Let i be an integer variable. How many times will the loop condition (i<100) be checked in the following C code snippet?

```
for (i=0; i<100; i=i+3)
    printf("i = %d\n", i);
```

Answer – 4.1:

i = 35

Question – 4.2:

Let two unsigned integer variables m and n hold the value 0 and 13643 respectively. Then, the following C code snippet is executed:

```

while (n > 0)
{
    m = (m*10) + (n%10);
    n = n/10;
}

```

What will be the value of m after this part of the code is executed?

Answer – 4.2:  
34631

Question – 4.3:

Let i, j, p be integer variables holding the same values 0 (zero).  
Then, the following C code snippet is executed:

```

while (i < 10)
{
    for (j = 0; j < 5; ++j)
        if (i != j) ++p;
    ++i;
}

```

What will be the value of p after this part of the code is executed?

Answer – 4.3:  
45

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+++++++ Topic-1 ++++++

Question – 1.1:

Declare a variable x of type float and initialize it to 2000.

Answer – 1.1:  
float x=2000;

Question – 1.2:

Read two variables which are declared as below using only one read function:

```

int a;
float b;

```

Answer – 1.2:  
scanf("%d%f",&a,&b);

Question – 1.3:

Fill-in the blanks with appropriate type-casting feature.

```
int x= _____ (22.0/7);
```

Answer – 1.3:

int or (int)

+++++ Topic-2 +++++

Question – 2.1:

What will be printed after the following code snippet has executed?

```
int x;  
float y, z;  
x = 10/3;  
y = x/3;  
z = x+y;  
printf ("%3.1f",z);
```

Answer – 2.1:

4.0

Question – 2.2:

What will be printed after the following code snippet has executed?

```
int a =10, b = 100;  
b += --a + 15;  
printf("%d,%d",a,b);
```

Answer – 2.2:

9,124

Question – 2.3:

What will be printed from the following code-segment?

```
int n=10;  
printf("%d\n",1/n);
```

Answer – 2.3:

0

+++++ Topic-3 +++++

Question – 3.1:

What is the output of the following code-segment?

```
int a=10, b=-4;  
if(a=5)  
    b=a+b;  
else  
    b=a-b;
```

```
printf("%d",b);
```

Answer - 3.1:

1

Question - 3.2:

What is the output of the following code-segment?

```
int x=10, y=5;
if(x = y && x > y)
    printf("%d",x);
printf("%d",x);
```

Answer - 3.2:

1,1,

Question - 3.3:

Is the statement

break;

mandatory under every cases for a switch-case statement?

Select one:

(a) True

(b) False

Answer - 3.3:

(b) False

+++++ Topic-4 +++++

Question - 4.1:

What will be printed by the following program segment?

```
int a = 33; int b = 0;
while(a>0) {
    a/=2; b+=a;
}
printf("%d", b);
```

Answer - 4.1:

31

Question - 4.2:

Which one is the wrong "for loop" declaration (that is, you get a compilation error)? Assume i and j both are declared as int data type (int i,j;).

(a) for(;;) { }

(b) for(i=0,j=1;;i++) { }

(c) for(i=0;j=1;i++;j++) { }

(d) for(i=0;j=1;i++,j++) { }

(e) for(i=0;j<1;i++) { }

Answer - 4.2:

(c)

Question – 4.3:

What will be printed by the following program segment?

```
int fact = 1, i = 1;
while (1) {
    fact = fact * i;
    ++i;
    if ( i<=6 ) continue;
    printf("%d",i);
    break;
}
printf("%d",fact);
```

Answer – 4.3:

7,720

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+++++++ Topic-1 ++++++

Question – 1.1:

If the following program fragment is run, what is printed?

```
int x=2.9;
printf("%d",x);
```

Answer – 1.1:

2

Question – 1.2:

a and b are two integer variables, with values 2 and 3 respectively.  
What will the following statement print?

```
printf("%0.2f, %0.2f", (float)(a/b), (float) a/b);
```

Choose a correct option:

- (A) 0.00, 0.67
- (B) 0.67, 0.00
- (C) 0.00, 0.00
- (D) 0.67, 0.67

Answer – 1.2:

(A) 0.00, 0.67

Question – 1.3:

Let c be a variable of type char. What does the following program do if an upper-case English letter is given as input through the keyboard?

```
scanf("%c",&c);  
printf("%c",c+'a'-'A');
```

Choose the correct option:

- (A) Prints a special character
- (B) Prints a digit
- (C) Does not print a printable character
- (D) None of the above

Answer – 1.3:

- (D) None of the above

+++++ Topic-2 +++++

Question – 2.1:

Assume that all the variables involved are of type int, and that the variable i holds the value 0 just before the execution of the following statements. What will you see on the screen after the following statements execute?

```
i++;  
++i;  
a=i++;  
printf("%d,%d", a,i);
```

Answer – 2.1:

2,3

Question – 2.2:

Let a be a variable of type int, and that it holds the number 42. Then, the following statements are executed.

```
a=a>>2;  
printf("%d", a);
```

What will you see on the screen?

Answer – 2.2:

10

Question – 2.3:

What does the following segment of a program print on to the screen? Assume that the variable a is of type int.

```
a=45;  
a=a<<2;
```



```
printf("%d", a);
```

Answer - 2.3:  
180

+++++ Topic-3 +++++

Question - 3.1:

Let a,b,c,d be variables of type int. Let a and b hold values 0 and 1 before the following program snippet is executed.

```
if(a=0)
    c=2;
else
    c=3;
if(b=1)
    d=2;
else
    d=3;
printf("%d, %d", c, d);
```

After the above snippet executes, what will you see as output?  
Choose the correct option:

- (A) 2, 2
- (B) 2, 3
- (C) 3, 2
- (D) 3, 3

Answer - 3.1:  
(C) 3, 2

Question - 3.2:

Suppose that c is a variable of type int holding the value 2. Then the following program snippet is executed. What will you see on the screen?

```
switch(c)
{
    case 1: printf("1");
    case 2: printf("2");
    case 3: printf("3");
    default: printf("-1");
            break;
}
```

Answer - 3.2:  
23-1

Question - 3.3:

What is the output of the following code snippet. Assume that a,b,c,d are variables of type int, and hold values 1,3,2 and 4 respectively when the following code snippet executes. After the execution what do you see on the screen?

```

if(a && b)
    printf("0");
if (a & b)
    printf("1");
if(c && d)
    printf("2");
if(c & d)
    printf("3");

```

Answer - 3.3:  
012

+++++ Topic-4 +++++

Question - 4.1:

Let i be a variable of type int. How many times will the condition (i<10) of the following for-loop be checked?

```

for(i=0; i<10; i++)
    ++i;

```

Answer - 4.1:  
6

Question - 4.2:

Let x,y,z,w are all variables of type int, and hold values 3, 1, -1 and 1 respectively. Then the following code snippet is executed.

```

for(i=1; i<=4; i++)
{
    x=y;
    y=z;
    z=w;
    w=x+y+z;
    printf("%d, ",w);
}

```

What will you see on the screen as output?

Answer - 4.2:  
1, 1, 3, 5,

Question - 4.3:

What is printed if the following code fragment is executed? Assume that n and i are variables of type int, and k is a variable of type float. k holds the value 0.0 just before the fragment is executed. The value of n is a positive integer read through the keyboard.

```

for(i=1; i<=n; i++)
    k+=i-(n+1)/2.0;

```

```
printf("%.2f",k );
```

Answer - 4.3:  
0.00

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+++++++ Topic-1 ++++++

Question - 1.1:

Consider that the size (in bits) of int is 16, float and long are 32 and double is 64. What will be the output of the following code snippet if executed successfully?

```
int a,b,c,d ;  
printf("Size of variable in bytes : %lu", sizeof((float) a *  
(int)b / (long)c * (double)d));
```

- a. Size of variable in bytes : 2
- b. Size of variable in bytes : 4
- c. Size of variable in bytes : 8
- d. Size of variable in bytes : 16

Answer - 1.1:

c

Question - 1.2:

What will be the output of the given code if executed successfully.

```
typedef long long int decimal;  
main(){  
    int i = -100;  
    decimal j = 3.0;  
    float f;  
    f = i/j;  
    printf("value of %d/%lld : %.2f", i,j,f);  
}
```

- a. value of -100/3 : -33.33
- b. value of -100/3 : -33.00
- c. value of -100/3 : 33.33
- d. value of -100/3 : 33.00

Answer – 1.2:  
b

Question – 1.3:

What will be the output for this code snippet if executed successfully? [Hint: ASCII value of 'A' is 65]

```
float c = 'C';  
printf("The output is : %d\n", (int)c) ;  
printf("The output is : %f\n", (float)c) ;  
printf("The output is : %c\n", (char)c) ;
```

- a. The output is : 67  
The output is : 67.000000  
The output is : C
- b. The output is : 38494723  
The output is : 67.000000  
The output is : C
- c. The output is : C  
The output is : C  
The output is : C
- d. The output is : 67  
The output is : 67  
The output is : 67

Answer – 1.3:  
a

+++++ Topic-2 +++++

Question – 2.1:

Consider two integer variables x and y with values 1 and 2 respectively. What is the value of x after the following expression is evaluated?

```
x=(x=(x=2,y=3+x));
```

Answer – 2.1:  
5

Question – 2.2:

Choose the correct option which will be the output of the following code snippet if executed successfully.

```
int i=0, j=0, k=0, l;  
l = i++ || j++ || k++ ;  
printf("%d,%d,%d,%d", i, j, k, l);
```

- a. 1,1,1,0
- b. 1,1,0,1
- c. 1,1,1,1
- d. 2,1,1,1

Answer – 2.2:

a

Question – 2.3:

What should be the values of x,y after the following assignments:

```
int x = 6*5/2+9;  
int y = x+2*3;
```

Options:

- A. 21,17
- B. 21,69
- C. 24,30
- D. 4,10

Answer – 2.3:

C

+++++ Topic-3 +++++

Question – 3.1:

Let the data type of variables x, var1, var2 be int, double and float respectively. What will be the most appropriate format specifier in the following print statement (fill the blank)?

```
printf("%____", (x < 50)? var1 : var2);
```

Answer – 3.1:

lf

Question – 3.2:

What is the output of the following C code snippet ?

```
int a=9, b;  
a= (5>2) ? (b=6) : (b=8);  
printf("%d",a);
```

- a. 1
- b. 6
- c. 8
- d. 9

Answer – 3.2:

b

Question – 3.3:

What is the output of the following code snippet?

```
if(-5)  
{    printf("X");    printf("Y");  
}  
else
```

```
printf("Z");
printf("#");
return 0;
```

Ans:

- a. XY
- b. Z#
- c. XY#
- d. XYZ#

Answer - 3.3:

c

+++++ Topic-4 +++++

Question - 4.1:

Consider the following code snippet.

```
int i, n, counter=0;
while(1)
{
    scanf("%d",&n);
    if(n==0) break;
    if( (n%3!=0) && (n%7!=0) ) continue;
    ++counter;
}
printf("%d", counter);
```

Suppose the user enters the following numbers in this sequence.

32 26 47 32 13 91 45 -35 22 35 43 0

What will be the output of the program when executed successfully?

- a. 5
- b. 6
- c. 7
- d. 4

Answer - 4.1:

d

Question - 4.2:

Consider the following code snippet.

```
for(i=2; i*i<n; i++)
{
    if(n%i==0)
        printf("Hello World\n");
}
```

Assume that the number n is of the form  $p \times p$  where p is a prime number  $\geq 2$ . For example, if  $p=5$ ,  $n=25$ .

How many times would "Hello World" be printed to the console for such values of n ?

- a. n
- b. p
- c. 0
- d. 1

Answer - 4.2:

c

Question - 4.3:

Consider the following loop definition. Assume that the variables sum and i are initialized to 0 for the loop definition. Also, let n = 4 for the loop definition.

```
do{
    sum = sum + i ;
    i++ ;
} while(++i<n);
```

Which of the following option is true?

- a. sum = 1 after execution.
- b. sum = 2 after execution.
- c. sum = 3 after execution.
- d. sum = 4 after execution.

Answer - 4.3:

b

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+++++++ Topic-1 ++++++

Question - 1.1:

Which of the following are invalid variable names?

- a. si-int
- b. InterestPaid
- c. FLOAT
- d. otp no

Answer - 1.1:

- a. si-int
- d. otp no

Question – 1.2:

Consider the following:

- 1. 'Thank you'
- 2. '23.56E-03'

Which of the following option is correct?

- a. 1 and 2 both are NOT character constants
- b. 1 is a character constant and 2 is NOT a character constant
- c. 1 is NOT a character constant and 2 is a character constant
- d. 1 and 2 both are a character constant

Answer – 1.2:

- a. 1 and 2 both are NOT character constants

Question – 1.3:

What is the output of this snippet?

```
int n;  
for (n = 9; n!=0; n--)  
    printf("n = %d", n--);
```

- a) Infinite Loop
- b) 9 7 5 3 1
- c) 9 8 7 6 5 4 3 2 1
- d) 9 7 5 3

Answer – 1.3:

- a)

+++++ Topic-2 +++++

Question – 2.1:

If a is an integer variable, a=5/2 will return a value:

- a. 2.5
- b. 3
- c. 2
- d. 0

Answer – 2.1:

- c. 2

Question – 2.2:

The expression x=4+2%-8 evaluates to:

- a. -6
- b. 6
- c. 4
- d. None of the above

Answer – 2.2:



b. 6

Question – 2.3:

What is the output of this program if executed successfully?

```
int x = 30;
main()
{
    int x = x;
    printf("%d", x);
}
```

- a) 1
- b) Garbage Value
- c) 30
- d) None of the above

Answer – 2.3:

b) Garbage Value

+++++++ Topic-3 ++++++

Question – 3.1:

What is the output when you run the following code-segment successfully?

```
main()
{
    int x=3, y=5;
    if( x== 3) printf(" %d",x);
    else ;
    printf(" %d",y);
}
```

Answer – 3.1:

3 5

Question – 3.2:

What is the output of this snippet when you run this successfully?

```
int x = 2;
(x & 1) ? printf("true") : printf("false");
```

- a) 2
- b) false
- c) true
- d) 0

Answer – 3.2:

b) false

Question – 3.3:

What is the output of this snippet?

What is the output of this code snippet if successfully executed?

```
int choice = 1;
switch (choice << (2 + choice))
{
    default:
        printf("default");
    case 4:
        printf("4");
    case 8:
        printf("8");
    case 5:
        printf("5");
}
```

- a) default
- b) 8
- c) 5
- d) 85

Answer – 3.3:

- d) 85

+++++ Topic-4 +++++

Question – 4.1:

What is the output of this snippet if you execute this successfully?

```
for(;;)
{
    printf("TESTING\n");
    break;
}
```

- a) TESTING
- b) No Output
- c) Infinite Loop
- d) None of the Above

Answer – 4.1:

- a) TESTING

Question – 4.2:

What is the output of this snippet if you run this successfully?

```
int k;
for(k=1; k <= 5; k++);
{
    printf("%d ", k);
}
```

- a) 1 2 3 4 5 6
- b) 1 2 3 4 5

- c) 6
- d) 5

Answer - 4.2:

- c) 6

Question - 4.3:

What is the output of this snippet if you compile this successfully and start executing?

```
main() {  
    int c = 5, no = 10;  
    do {  
        no /= c;  
    } while(c--);  
    printf("%d", no);  
}
```

- a) 0
- b) 1
- c) Runtime Error
- d) 2

Answer - 4.3:

- c) Runtime Error

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