Department of Computer Science & Engineering
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Practice Sheet #02

Topic: C Programming Elements

Date: 15-01-2017

1. Which of the following is not a legal name of a C variable?

   (a) _123var
   (b) 123_var
   (c) var_123
   (d) var123_

2. Which of the following conditions is equivalent to the condition
   (! ((x>=y) && (y>=z)))?

   (a) (! (x>=z))
   (b) (x<=z)
   (c) ((x<y) && (y<z))
   (d) ((x<y) || (y<z))

3. What are the least and largest integers representable in the 10-bit signed 2's complement format?

   (a) -2^9, 2^9
   (b) $-2^9 + 1$
   (c) $-2^9 + 1$
   (d) -2^9; $2^9 + 1$

4. Given that a, b, c, d are very large floating point variables and we have to compute (a*b)/(c*d), which will be the preferred way?

   (a) (a*b) / (c*d)
   (b) a* (b / (c*d))
   (c) (a/c) * (b/d)
   (d) ((a*b) / c) / d

5. Which of the following is not a legal floating-point constant in C?

   (a) +123.45
   (b) -12345.
   (c) +5.43e + 21
   (d) -5.43e - 2.1

6. Which one of the following is a valid name of a C variable?
   (a) 2ab_c
   (b) Switch
   (c) xy#1
   (d) "rst"

7. For the following list of identifiers, tick the ones that are valid and cross out the ones that are invalid. If any is invalid, briefly write the reason why it is invalid.

(a) break
(b) _1
(c) While
(b) ink^jet

8. Which of the following can be a valid name of a C variable?
   (a) default
   (b) _default
   (c) –default
   (d) 123default

9. What is the value of x after the following statements are executed?
```
int m = 5, n = 5, x;
char p = ’p’, q = ’q’;
x = !((m>=n)||(m<=n)&&(p>q));
```
   (a) 0
   (b) 1
   (c) -1
   (d) Any non zero value

10. Let the variables in the code be defined as: int a = 5; int b = -3; int c = 0. Which of the following conditions evaluates to true in the ‘C’ programming language?
   (a) (a < b) || (c < b)
   (b) (c < a) && (c < b)
   (c) (a > b) && !c
   (d) !(a + b > c)

11. State which of the following (A, B, C, D) are valid variable names in C.
   (a) first&second
   (b) first_second
   (c) while
   (d) 1st2nd

12. Find the number of tokens in the following C statement. Assume variable i is of type int and has been assigned a value 10**.**
```
printf ("i = %d, &i = %x Divide I by 2 =", i , &i , i/2);
```
   (a) 3
   (b) 14
   (c) 10
   (d) 16

13. Figure out the output of the below codes written in C programming language. State relevant assumptions if any during computation.

a.
```
#include <stdio.h>
#include <stdbool.h>
 int main()
{
      int a=10, b=4;
      bool res = ((a == b) && printf("C Language"));
      printf(" res= %d",res);
      return 0;
```

```
}
```

(a) No output
(b) Compile Error at Line 4
(c) res= 0
(d) Language res= 0

b.

```
#include <stdio.h>
#include <stdbool.h>
int main()
{
    int a=10, b=4;
    bool res =printf("C Language") && ((a == b) );
    printf(" res= %d",res);
     return 0;
}
```

(a) No output
(b) Compile Error at Line 4
(c) res= 0
(d) Language res= 0

14. Figure out the output of the below codes written in C programming language. State relevant assumptions if any during computation. Assume value of x is 10. All relevant libraries have been included.

```
printf ("x << 3 = %d\n", x << 3);
printf ("x >> 3 = %d\n", x >> 3);
```

(a) x << 3 = 80, x >> 3 = 1
(b) x << 3 = 30, x >> 3 = 1
(c) x << 3 = 30, x >> 3 = 1
(d) x << 3 = 80, x >> 3 = 10

15. Figure out the output of the below code written in C programming language. State relevant assumptions if any during computation.

```
#include<stdio.h>
int main()
{
    char m= 100;
    printf("m= %d",m);
    return 0;
}
```

(a) Error at Line 5
(b) m=100
(c) Error at Line 4
(d) No output

16. Figure out the output of the below code written in C Programming Language. State relevant assumptions if any during computation.

```
#include<stdio.h>
int main()
{
        int a = 7, b = 11;
        printf("a = %d, b = %d", a, b);
        printf("  a&b = %d", a&b);
```

```
        printf("  a|b = %d", a|b);
        printf("  a^b = %d", a^b);
        printf("  ~a = %d", a = ~a);
        printf("  ~b = %d", b = ~b);
        return 0;
    }
```

(a) a = 7, b = 11   a&b = 3   a|b = 15   a^b = 12   ~a = -8   ~b = -12
(b) a = 7, b = 11   a&b = 4   a|b = 13   a^b = 11   ~a = -8   ~b = -11
(c) a = 7, b = 11   a&b = 5   a|b = 16   a^b = 12   ~a = -7   ~b = -12
(d) a = 7, b = 11   a&b = 5   a|b = 15   a^b = 13   ~a = -7   ~b = -12

17. Figure out the output of the below code written in C Programming Language. State relevant assumptions if any during computation.

```
#include<stdio.h>
    int main()
    {
        int a,b,c;
        a = 1, 2, 3, 4;
        printf("%d", a);
        return 0;
    }
```

(a) 1
(b) 2
(c) 3
(d) 4

18. Figure out the output of the below code. State relevant assumption if any during computation.

```
#include<stdio.h>
    int main()
    {
        int x = 10;
        int y = 15;
        printf("%d", (y, x));
        return 0;
    }
```

(a) 15
(b) Error at printf(“%d ”,(y,x));
(c) 10
(d) 1.5

19. Figure out the output of the below code. State relevant assumption if any during computation.

```
#include<stdio.h>
    int main()
    {
        int x = 10;           //Line 1
        int y = (x++, ++x); //Line 2
        printf("%d", y);    //Line 3
        getchar();           //Line4
        return 0;            // Line 5
    }
```

(a) Error at line 2
(b) 10
(c) 11
(d) 12

20. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
  {
      int x = 1, y;
      y = (x++, printf("1- x = %d   ", x), ++x, printf("2- x = %d   ", x), x++);
      printf("3- y = %d   ", y);
      printf("4- x = %d   ", x);
      return 0;
  }
```

(a) 1- x = 2 2- x = 3 3- y = 3 4- x = 4
(b) 1- x = 1 2- x = 2 3- y = 3 4- x = 4
(c) 1- x = 2 2- x = 2 3- y = 4 4- x = 3
(d) 1- x = 2 2- x = 3 3- y = 4 4- x = 5

21. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
  {
      int a = 10, i=5;
      double d = 106.21;
      int int_size = sizeof(i+=3);
      printf("%d  ", sizeof(a+d));
      printf("size of i = %d  ", int_size);
      printf("Value of i = %d  ", i);
      return 0;
  }
```

(a) 8 size of i = 4 Value of i = 6
(b) 8 size of i = 4 Value of i = 5
(c) 4 size of i = 4 Value of i = 5
(d) 4 size of i = 4 Value of i = 6

22. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
{
    int a = 3, b = -8, c = 2;
    printf("%d", a % b / c);
    return 0;
}
```

(a) 1
(b) 2
(c) 3
(d) 4

23. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
    {
        int a = 10;              //Line 1
        a+=20;                   //Line 2
        a++ = 20;                //Line 3
        printf("a = %d", a);
        return 0;
    }
```
(a) Error at Line 2
(b) Error at Line 3
(c) 24
(d) 5

24. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
{
        float c = 5.0;
        printf ("Temp@Fahrenheit is %.2f", (9/5)*c + 32);
        return 0;
 }
```
(a) Temp@Fahrenheit is 41.00
(b) Temp@Fahrenheit is 37.00
(c) Temp@Fahrenheit is 0.00
(d) Temp@Fahrenheit is 42.00

25. Figure out the output of the below code. State relevant assumption if any during computation. Assume Necessary libraries have been included.

```
int main()
    {
        char a = '\012';
        printf("%d", a);
        return 0;
    }
```
(a) Compile Error
(b) 10
(c) 12
(d) Empty

26. If the number of bits in the memory address of a computer is 16, what is the maximum number of addressable memory locations?

27. For questions 8.1 to 8.4 assume that variables a and b have data type int and variable c and d have data type float. Also, a = 9, b = 8, c = 16.0, and d = 6.0. For each question write the value assigned to the variable z. Data type of z is float.

1. z = a + c / 4 * d / 3 + b

2. z = c + a / 4 * b / 3 + d

3. z = (int) c / a * b / 3

4. z = a / b * b % 5 % 3

28. Write the values of the following expressions.
a. ‘F’ – ‘C’

b. 2.0 + (float) (5/3)

29. Consider the following snippet of a C-program for which int and unsigned data-types are represented by 8-bits each. Write the minimum and maximum possible values which can be correctly stored in the variables a and b. Show details of your steps.

```
int main ()
{
        int a;
        unsigned b;
        . . . .
}
```

30. Evaluate the expression: 1 && 0 % 10 >= 0 && 30 % 10 <= 3. Show the steps of your expression evaluation.

31. What is the minimum number of bits needed to represent the variable c, declared as “char c”?

32. If the ASCII character code for ’A’ is 65 then what is the character code of ’P’ should be?

33. Evaluate the following expressions.
(A) 3+-5*-2

(B) 10 - 5 - 7 / 4 * 4

(C) 3 > 5 - 2

(D) 3 + 5%2 – 1

34. From the expression (- 2) * (x - 3) < x + (2 * z) && (z < 10), remove all the unnecessary parenthesis so that the meaning does not change.

35. What are the values of the following expressions?
(A) 3.0/6 + 18/(15%4+2)

(B) 24/(1 + 2%3 + 4/5 + 6 + 31%8)

36. The correct statement which assign the decimal result of dividing the integer variable sum by 3 into the float variable costing, is? (Use type casting to ensure that floating point division is performed.)
Given: int sum = 7; float costing;
(A) (float) costing = sum / 3 (B) costing = (float) (sum / 3)

(C) costing = (float) sum / 3 (D) costing = float (sum / 3)

37. Let (x1, y1) and (x2, y2) be the co-ordinates of two given points. Write down a logical expression using the variables x1, y1, x2, y2, which is TRUE when both the points lie in the same quadrant of the co-ordinate system. Assume that none of the points lie on the co-ordinate axes. A short expression is preferred.

38. What is the maximum unsigend integer represented by a 16 bit binary number?

39. Fill the blank space. int x= ______________ 5.0;

Problems for practice

(After the successful studies of Lecture 01 (Introduction to Computer) and Lecture 02 (C Programming elements), the students are supposed to solve the following problems ion C programming language.)

1. Write a program which will read temperature value in Fahrenheit scale and print the value in Celsius scale.

2. Write a C program to enter length and width of a rectangle and find area and perimeter of the rectangle.

3. Write a C Program to enter two angles of a triangle and find the third angle of the triangle. Also, test whether the triangle is isosceles or a right angled.

4. Write a C program to enter days and convert it to years, months and weeks.

5. Write a C program to enter marks of five subjects of a student and calculate total, average and percentage of all subjects.

6. Write a program which will read the radius of a circle and print the area and perimeter of the circle.

7. Write a C program to enter your name and print the same.

8. Write four statements by using printf function to print an asterisk pattern having 1, 3,5 and 7 asterisks (*) in successive lines so that it generates a triangular pattern as given below.

```
      *
    * * *
  * * * * *
* * * * * * *
```

9. Consider a bank that offers fixed deposit accounts with cumulative (annually) interest on the balance available in the account. Write a C program that reads the amount initially invested (called Principal amount) in an account and interest rate. The program generates the balance available in the account at the end of each year for first five years.

10. If a particle vertically thrown upwards with a velocity u, then after which time it will just touch the ground? Write a C program to calculate the time in seconds reading a velocity u from the keyboard. [Assume g = 9.8 ms-2]

11. A ball is released from a height of Y meters. Each time it bounces on the floor, its velocity becomes halved. Write a program, which reads the value of Y and prints the total distance traversed by the ball when it touches the ground for the third time. Assume that the value of acceleration due to gravity, g, is 9.8.

12. An ant is sitting at the left end of a rope of length 10 cm. At t=0 the ant starts moving along the rope to reach the other end of the rope. The ant has a speed of 1 cm per second. After every second the rope stretches instantaneously and uniformly (along its length) by 10 cm with the left end fixed at the point from where the ant started its journey. Suppose that the ant's legs provide it sufficient friction in order to withstand the stretching of the rope. Write a program to demonstrate that the ant will be able to reach the right end of the rope. Your program should also calculate how many seconds the ant would take to achieve this goal. You may assume that the length of the ant is negligible (i.e., zero).

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