

CS 101 2015-16 Semester 2 – Quiz1

(Time: 1 hr)

Instructions for evaluation:

- While correcting the answer sheets, circle the answers and cross out anything irrelevant.
- Do not correct answers written in pencil.

Q1. Given below is a program to compute $\sin(x)$ of given a real number x by approximating the following series to $n > 1$ terms for a large value of n .

$$\sin(x) = x - x^3 / 3! + x^5 / 5! - x^7 / 7! \dots$$

Fill in the blanks to complete the program. Assume that the value of n does not exceed 10^9 .
(12 marks = 1+1+1+1+1+2+5)

Program:

```
#include <simplecpp>
main_program {
    float/double x;
    int n;
    cin >> x;
    cin >> n;
    int i; // position i
    float/double term = x; // ith term of the series
    float/double sum = x; // sum of i terms
    i = 2;
    repeat(n-1) {
        term = -term*x*x/((2*i-1)*(2*i-2));
        sum = sum + term;
        i++;
    }
    cout << sum << endl;
}
```

Q2. Write the output of the following program.

(8 marks=2+2+2+2)

```
#include <simplecpp>
main_program{

    double x,u;
    int y,b,z,w,v;

    x = 1.5;
    v = 14/2*x;
    cout << v%10+1 << endl;
    // a%b calculates the remainder when a is divided by b

    x = 15 - 25/2;
    y = 2.5/x;
    cout << y << endl;

    b = 12.0/2+1.0;
    z = b/2.0 + (b)%2;
    cout << z << endl ;

    w = 7.5;
    if((w*4.0)/10.0 < 3){
        u = w + 1;
    }
    else{
        u = w + 1.5;
    }
    cout << u << endl;
}
```

Answer:

1

0

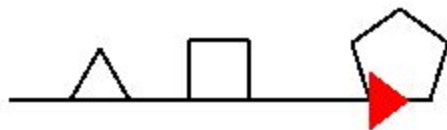
4

8

Q3. Consider the following program:

<pre>#include <simplecpp> main_program { turtleSim(); forward(10); forward(10); left(120); forward(10); left(120); forward(10); left(120); forward(20); forward(10); left(90); forward(10); left(90);</pre>	<pre>forward(10); left(90); forward(10); left(90); forward(30); forward(10); left(72); forward(10); left(72); forward(10); left(72); forward(10); left(72); forward(10); left(72);</pre>
--	--

a) Draw the figure traced by the turtle. Label the distances with appropriate values over your figure. **(8 marks=3 marks for correct figures: give 3 marks if all are correct and 0 if even one is incorrect, 2 marks for their correct order, 3 marks for correct distances)**



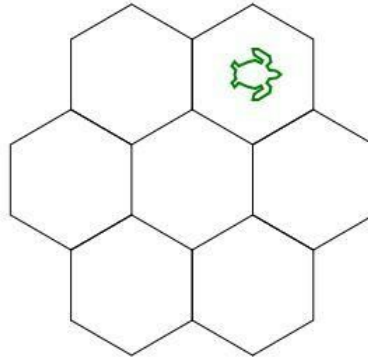
distances: 10, 10, 20

- b) The given code is an example of a badly structured program. The better code for the same problem has been given below. Complete it by filling up the blanks with appropriate expressions involving variables or numbers to produce the same diagram. **(12 marks=1+3+3+1+4)**

```
#include <simplecpp>
main_program
{
    int len = 10;
    int count = 1;
    turtleSim();

    repeat(3)
    {
        forward(len*count);
        repeat(count+2)
        {
            forward(len);
            left(360/(count+2) OR 360.0/(count+2));
        }
        count = count + 1;
    }
}
```

Q4. Complete the following code to draw the honeycomb consisting of six hexagons as shown in the following figure. The box part of the code draws a single hexagon of side length 50, with the initial and final configuration of the turtle being at the center of this hexagon facing right. The start position of the turtle is shown in the figure and you are expected to draw the hexagons in clockwise way. **(10 marks=4+4+2)**



```
#include<simplecpp>
```

```
main_program{
```

```
    turtleSim();
```

```
    penUp();
```

```
    int i = 1;
```

```
    repeat(6)
```

```
    {
```

```
        left(90);
```

```
        forward(50);
```

```
        penDown();
```

```
        right(120);
```

```
        repeat(6)
```

```
        {
```

```
            forward(50);
```

```
            right(60);
```

```
        }
```

```
right(60);  
penUp();  
forward(50);  
left(90);
```

```
right(60*i);  
forward(50 * sqrt(3));  
left(60*i);  
i = i+1;  
}  
return 0;  
}
```