

CS 101 2015-16 Semester I. Quiz 1 (version A)

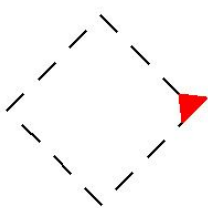
August 28th, 2015. 820am-910am (50 minutes). Marks: 12, Weight: 10%

There are 12 questions in this quiz, on 8 pages (4 sheets with questions on both sides).

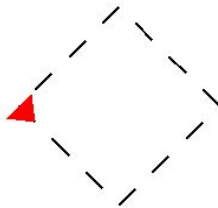
Write your answers directly on this answer paper in the spaces provided. You can use answer sheets provided for rough work, but we will NOT be taking those back, so you MUST write your final answer on this sheet itself.

1. Study the following turtle simulator program. Which of the patterns shown will it draw?
Recall that in the turtle simulator, initially the turtle faces east, and pen is down.

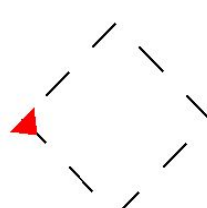
```
#include<simplecpp>
main_program {
    turtleSim();
    right(45);
    repeat (4) {
        repeat (2) {
            penUp();
            forward(30);
            penDown();
            forward(30);
        }
        left(90);
    }
    wait(60);
}
```



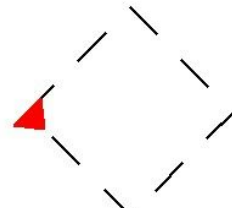
(a)



(b)



(c)



(d)

It will draw pattern _____**d**_____ (Write one of a,b,c,d).//Marking scheme 0/1.

2. The following turtle simulator program is supposed to draw a triangle. It may or may not have an error. Fill in the blank to state the error, and the correction, or write “There is no error” in the blank. *Do not write a long sentence that will go beyond the blank.* Recall that in the turtle simulator, initially the turtle faces east, and pen is down.

```
#include <simplecpp>
main_program{
    turtleSim();

    repeat (3) {
        forward(100);
        left(60);
    }
    wait(5);
}
```

The error is _____ **left (60) - the angle is wrong** _____.

The correction is _____ **left(120) or right (120)** _____

//Marking scheme 0/1 - 1 should be given only if gotten the error AND the correction. 0 even if got error but didn't get correction.

3. The following turtle simulator program is trying to draw the pattern shown below. Fill in the blanks to complete the program. Recall that in the turtle simulator, initially the turtle faces east, and pen is down.

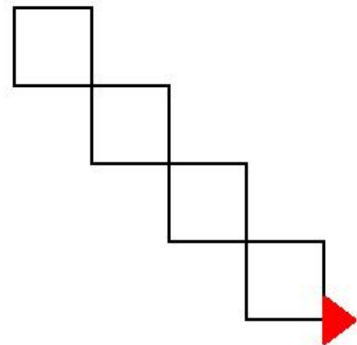
```
#include<simplecpp>

main_program {

    turtleSim();
    repeat (4) {
        repeat (4) {
            forward(50);
            right(90);
        }
        forward (50);
        _____; // blank 1

        forward (50);

        _____; // blank2
    }
    wait(100);
}
```



blank 1: right(90). blank2: left(90);

Marking scheme: 0/1 - both correct: 1, only one or none correct: 0

4. The binary representation of the decimal number 417 is: *(show your working)*

Working: $417 = 256 + 128 + 32 + 1 = 2^8 + 2^7 + 2^5 + 2^0$

Answer: 110100001

Marking scheme: 0/1 - correct answer with working: 1, else 0.

5. The decimal representation of the binary number 1010.11 is: *(show your working)*

Working:

$1010.11 = 8 + 2 + 0.5 + 0.25 = 10.75$

Answer: 10.75

Marking scheme: 0/1 - correct answer with working: 1, else 0.

6. What will be the output of the following program

```
#include<simplecpp>
main_program {
    int m, n, j;
    float p, q, r;

    n = 3; m = 2;
    p = 8.1; q = 5.3;
    r = n/m; // 1.0
    j = p*q/r; // 8.1*5.3/1.0 = 42.93 → 42
    r = j * p ; // 42 * 8.1 = 340.2

    cout << r << endl;
}
```

The output is 340.2

Marking scheme: 0/1 - correct answer with working: 1, else 0.

7. The following program is supposed to take as input a number n and output the lower case letter that is the n th in the alphabet. If the number is greater than 26, then it should “wrap around”. E.g.

- If input is **5**, output should be **e**
- If input is **24**, output should be **x**
- If input is **30**, output should be **d** (since $30 \% 26 = 4$, and d is the 4th letter)
- If input is **60**, output should be **h** ($50 \% 26 = 8$, h is the 8th letter)

It may have an error. Fill in the blank to state the error and the correction, or write “There is no error”.

```
#include<simplecpp>
main_program {

    int n;
    char c;

    cin >> n;
    c = 'a' + (n % 26);
    cout << c << endl;

}
```

The error is **c = 'a' + (n % 26);**

The correction is **c = 'a' + (n-1) % 26;**

One more correction possible: **if (n%26 == 0) c = 'z';**
else c = 'a' + (n%26) - 1

//Marking scheme 0/1 - 1 should be given only if gotten the error AND the correction. 0 even if got error but didn't get correction.

8. The following program is supposed to calculate the first n terms of this product:

$$\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2+\sqrt{2}}}{2} \cdot \frac{\sqrt{2+\sqrt{2+\sqrt{2}}}}{2} \dots\dots\dots$$

Note that the 1st term is: $\frac{\sqrt{2}}{2}$, the second term is $\frac{\sqrt{2+\sqrt{2}}}{2}$ and the third term is $\frac{\sqrt{2+\sqrt{2+\sqrt{2}}}}{2} \dots$ and so on. The program has to calculate the product of n such terms.

```
#include<simplecpp>
main_program {

    int n;
    float term=0.0, prod=1.0;
    cin >> n;
    repeat (n) {

        term = __sqrt(2 + term)____;    // fill in the blank
        prod *= (term/2.0);
    }

    cout << prod << endl;
}
```

Fill in the blank to complete the program.

//Marking scheme 0/1 - 1 if fully correct. No partial marks.

9. The following program is calculating the sum of the first $n+1$ terms of a series. What is the series? Write it in the blank in the usual mathematical style as a function of a variable x .

```
#include<simplecpp>
main_program {
    int i=1, n;
    float v, term = 1.0, sum=1.0;
    cin >> v >> n;
    repeat (n) {
        term = (term/i)*(i+1) * v;
        sum += term;
        i++;
    }
    cout << sum << endl;
}
```

The series being calculated is: $1 + 2x + 3x^2 + 4x^3 + \dots + (n+1)x^n$
Some may write the finite sum of the above series which is:
**//Marking scheme 0, 0.5, 1 - if largely correct (last term missing ok, or slightly wrong ok).
Partial marks according to closeness of answer by your judgement**

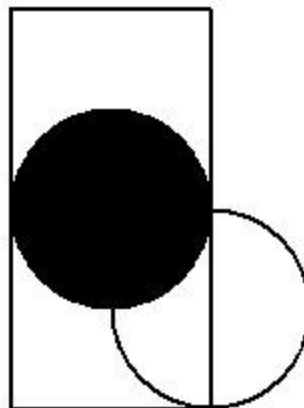
10. The following program produces a picture that is a little different from the picture shown.
Make the change on the picture, to show the correct picture.

```
#include<simplecpp>
main_program {

    initCanvas("Quiz", 600, 600);

    Circle c1(200,200, 50);
    Rectangle r1(350, 350, 50, 100);
    c1.setFill(1);
    c1.imprint();
    c1.move(50,50);
    c1.setFill(0);
    r1.move(-150,-150);
    r1.scale(2);
    getClick();
}
```

Show the change on the picture itself:



//Marking scheme 0.5 or 1 based on how close the filled circle is to the actual spot. 1 can be given to largely ok looking. 0.5 to general “direction” being correct.

11. What does this program do? Write True or False in front of the statements.

```
#include<simplecpp>
main_program {

    initCanvas("Quiz", 600, 600);

    float x1, y1, x2, y2, x3, y3, s1, s2;

    int m = getClick();
    x1 = m/65536;  y1 = m%65536;
    m = getClick();
    x2 = m/65536;  y2 = m%65536;
    m = getClick();
    x3 = m/65536;  y3 = m%65536;

    bool b=true;
    if (x2 != x1)
        s1 = (y2-y1)/(x2-x1);
    else b = false;
    if (x3 != x2)
        s2 = (y3-y2)/(x3-x2);
    else b = false;

    if (b && ( (s1 - s2)/s1 < 0.1) ) {
        Line l1(x1, y1, x3,y3);
        getClick();
    }
    else if (b){
        Line l2(x1, y1, x2,y2);
        Line l3(x1, y1, x3,y3);
        Line l4(x3, y3, x2,y2);
        getClick();
    }
}
```

- A. ~~It accepts 3 clicks by the user on the canvas (True/False) // was ambiguous.~~
~~cancelled.~~
- B. It always draws at least one line. **False.**
- C. It draws zero, one , two, or three lines **False.**

Marking scheme: 0, 0.5, 1 if zero, one or two correct.

12. Look at the above program again (of Q11), state whether true or false

D. It draws one line if the 3 clicks are approximately on one line **True.**

E. It draws one line if the 3 clicks are exactly on one line **False.**

F. The program may draw a vertical line. **False.**

Marking scheme: 0, 0.5, 1 if zero, one or any two (or more) correct.

ROUGH WORK