ICS208 Exam Review Questions

Part B Questions

1. If x is 7 and y is 8, then what are the values of the following? Show all of the steps.

   a) y >= 8

     = ___ >= 8

     = ___

   b) x < 23 && x > 6

     = ___ < 23 && ___ > 6

     = ___ && ___

     = ___

   c) !(y >= y)

   d) x < y || x !=7

2. Write a Boolean expression to represent each of the following:

   a) x is greater than 50   _____

   b) x is equals 7   _____

   c) x is over 50 or under 40 (not including 40 and 50)   _____

   d) x is over 50 or under 40 (including 40 and 50)   _____

3. Assume all numbers are integers. What are the answers to the following questions?

5/2	7/3	3/0	25/5
5%2	7%3	3%0	25%5

4. This is an example of the input and output of the following program:

```
Enter a time in seconds: 7
It is on the ground
```

Fill in the blanks so that the program will produce that input and output.

```
public class _____
{
    public static void main (String args[])
    {
        new rocket ();
    }
    _____ rocket ()
    {
        _____ time = IBIO.inputDouble ("_____");
        double _____ = 100 - 4.9 * time * time;

        if (height > 0)
            System.out._____ ("The height is " + height);

        _____ if (height == 0)
            System.out.println ("It has just landed");
        else
            System.out.println ("_____");
    }
}
```

5. Circle and correct 5 errors in this program.

```
public class ifs
{
    public static void main (String [])
    {
        new test ();
    }

    public ifs ()
    {
        double age = IBIO.inputDouble ("What is the age of the sun? (millions of years) ");
        if (age => 8 || age < 3)
            System.out.println ("Way off!");
        else if (age == 4.5);
        {
            System.out.println ("That's right!");
            System.out.println ("You are very clever.");

        else
            System.out.println ("Pretty close, it is 4.5 million.");
    }
}
```

6. The following questions are based on this class:

```
public class chair
{
    public static void main (String args[])
    {
        new chair ();
    }

    public chair ()
    {
        double bob = IBIO.inputDouble ("Enter a number: ");
        if (bob > 10)
            System.out.println ("Yip");
        else if (bob < 2)
            System.out.println ("Key");
        else if (bob != 8)
            System.out.println ("Lei");
        if (bob > 5)
            System.out.println ("Hat");
        else
            System.out.println ("Cattle");
    }
}
```

(a) What is the name of this class?   _____

(b) Find a Boolean expression in the code: _____

(c) What type of variable is declared?   _____

(d) What is the variable name?   _____

(e) What should the class be saved as?   _____

(f) What is printed for each of the following pieces of input?

```
bob is 11

bob is 1

bob is 3

bob is 5

bob is 8
```

7. Circle true or false based on the adjacent code.

```
public class series
{
    public static void main (String args[])
    {
        new series ();
    }


    public series ()
    {
        int a = 1000;
        while (a >= 1)
        {
            System.out.print (a + " ");
            a /= 10;
        }
        System.out.println ("");

        for (int i = 0 ; i < 20 ; i += 4)
        {
            System.out.print (i + " ");
        }
    }
}
```

T F a. There are three methods in this code.

T F b. The loop stopping condition in the first loop is `(a>=1);`

T F c. The Boolean expression in the first loop is equivalent to `!(a<1)`

T F d. If statements can go inside loops.

T F e. Loops can go inside loops.

T F f. If there is more than one line of code in a loop, the code needs to go in `{ }`

T F g. A loop stopping variable in this code is `a`.

T F h. `a/=10` divides a's value by 10.

T F i. The first loop prints: `1  10  100  1000`

T F j. The second loop prints: `1  5  9  13  17`

8. Fill in true or false in the following chart.

	Loops	Ifs
a) Boolean Expressions used.		
b) Repeats code.		
c) Multi-lines enclosed in { }.		
d) No semi-colon after the Boolean expression		
e) Makes decisions about which code to run.		
f) Types include for and while.		

9. Label the parts of the loop:

```
        char continu = 'y';
        while (continu == 'y')
        {
          System.out.println ("\nHi");
          System.out.println ("Hello");
          System.out.println ("Howdy");
          continu = IBIO.inputChar ("Continue? (y/n)");
        }
```

10. Write loops that print out each of the following sequences.

(a) 0 3 6 9 12 15 18   (b) 12 13 14 15 16 17 18 19 20 21 22 23

11. Add a loop around this code to make the program run until the user wishes to quit.

```
public class testy
{
    public static void main (String args[])
    {
        new testy ();
    }

    public testy ()
    {
        int score = 0;
        int count = 0;


        int n1 = (int) (Math.random () * 4) + 1;

        int n2 = (int) (Math.random () * 4) + 1;



        int ans = IBIO.inputInt ("What is " + n1 + " + " + n2 + "? ");
        if (ans == n1 + n2)
            score++;

        count++;

        System.out.println ("Your score is: " + score + " out of " + count);

    }
}
```

12. Trace the following program:

```
public class spoon
{
    public static void main (String args[])
    {
        new spoon ();
    }

    public spoon ()
    {
        int y = 12;
        System.out.println (y);
        int b = plate (8);
        System.out.println (fork (b));
        y = plate (2);
        System.out.println (plate (3));
        System.out.println (fork (8));
        System.out.println (y);
    }
```

```
    public int fork (int a)
    {
        a += 3;
        return a;
    }


    public int plate (int j)
    {
        j--;
        return j;
    }

}
```

Tracing Chart:

y	b	j	a	Output

13. Convert the while loop to a for loop.

```
    int i = 9;

    while (i<20)

    {   System.out.println(i);

        i+=2;

    }
```

14. Write a method that takes a String and returns an int.
    The String will be the user password and the int will be computer access level for that password.
    Nothing should be printed out in the method and it should be efficient.

Password	password *or* qwerty	Adr34kg	J&jwuth	K56$#je	Gorski
Access Level	1	2	3	3	5

15. Fill in this chart: how do =, == and .equals differ?

	=	==	.equals
(a) Types it can be used with			
(b) Used in a Boolean expression?			
(c) Used in an assignment statement?			
(d) Changes memory; Changes value of variable?			
(e) Tests value of variable, no changes to memory			

16. Write in the speed information for each algorithm.

(a)	Swap		(f)	Sum	
(b)	Binary Search		(g)	Average	
(c)	Print		(h)	Linear Search	
(d)	Min		(j)	Bin Sort	
(e)	Max		(k)	Selection Sort	
			(l)	Bubble Sort	

17. Binary Search for 38, then again for 41.

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
23	24	26	28	31	33	34	38	39	40	41	44	45	47	56	59	67

18. The observations are the time (in seconds) between eruptions for the Old Faithful geyser in Yellowstone National Park.

```
4.37 3.87 4.00 4.03 3.50 4.08 2.25 4.70 1.73 4.93 1.73 4.62 3.43 4.25
```

   a) Create the array

   b) Print the array

   c) Find the maximum

   d) Find the sum

19. Suppose that you have these arrays. They represent the inventory of the number of shirts of various sizes in a store.

```
String sizes[]={"xs", "s", "m", "l", "xl", "xxl"};
int count[]={2, 12, 14, 12, 2, 1};
```

(a) Print out a nicely formatted table that looks like this, using a for loop.

```
     Size   Number in Inventory
1    xs     2
2    s      12
3    m      14
4    l      12
5    xl     2
6    xxl    1
```

(b) Write a "find" function. From the user, ask the size.
Then, look through the array with a for loop and print the count of that size.

20. Draw a screen flow diagram for the following applet.

Splash Screen

Boost selector

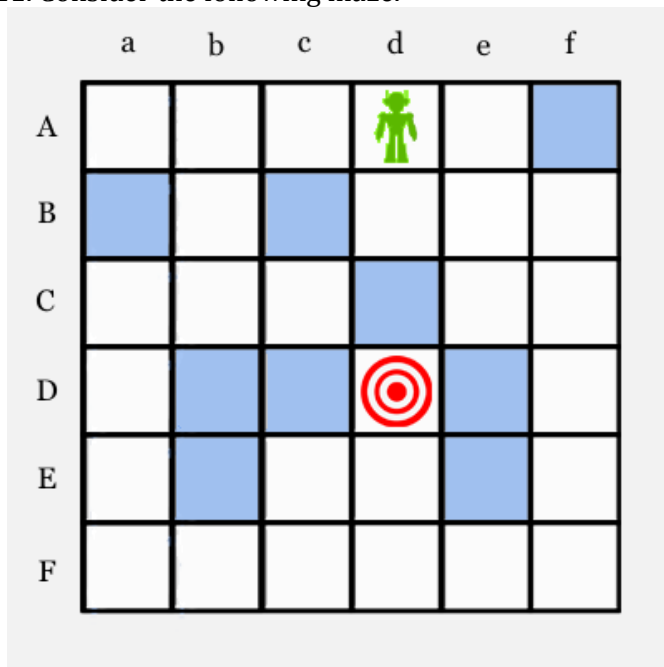Game Screen
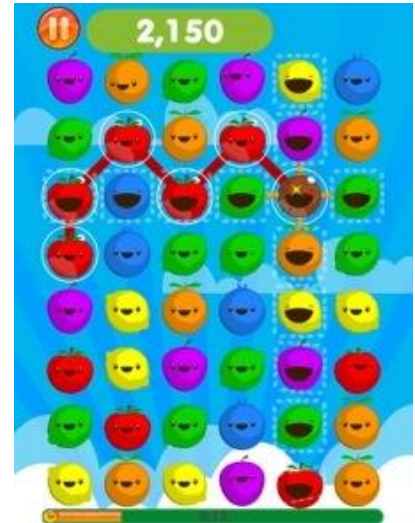
Mission Complete Screen

Game Score Screen

Leader Board Screen

21. Consider the following maze.

a) What pictures would be needed to make it?

b) Make an array memory diagram for it.

c) Declare the array that would be needed.

Part C Questions

22. Write the code needed to reverse an array's order.

For example, if you had:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
88	89	90	91	92	93	94	95	96	97	98	99	100	101

It would become:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
101	100	99	98	97	96	95	94	93	92	91	90	89	88

The array's name is a. It is completely full. It's length is a.length. It is not necessarily 14 elements long.

23. A digital clock displays four digits. Each digit is displayed using seven segments that are each either on or off as shown below. The clock breaks. Exactly one of the seven segments of one digit does not turn on. If the broken clock displays the time 6:39, which of the following might be the real time?

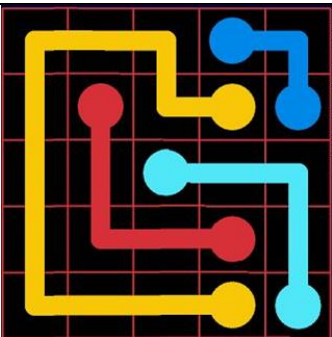   (a)   6:33   (b)   8:39   (c)   5:35   (d)   6.39

24. A beaver moves in strange ways. He starts at the middle position, as shown below. He will make five moves, alternating between right (R) and left (L): he first moves right, then left, then right, then left, and finally, right. On each move, he can jump 1, 2, 3, 4 or 5 positions from his current position. He picks each distance exactly once. For example, he can move R by 2, L by 1, R by 5, L by 4 and R by 3, ending at 2 − 1 + 5 − 4 + 3 = 5 positions to the right from where he started. For your convenience, every second position is shaded.
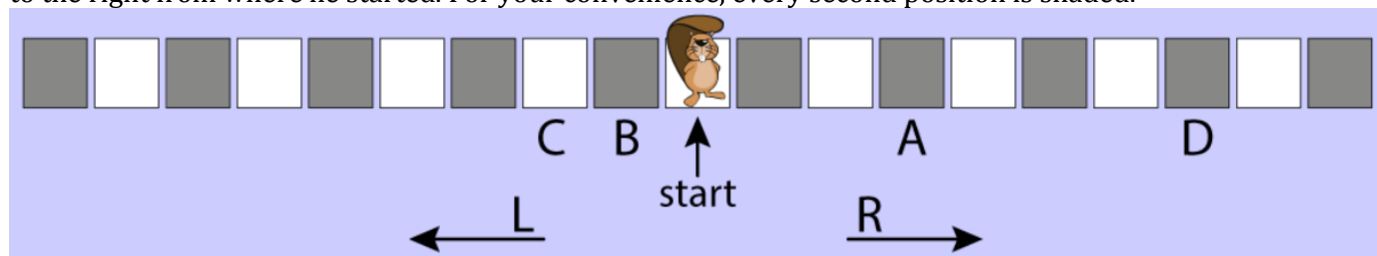
Out of the four positions marked by a letter, there is one that he cannot end up on. Which one?
   (a)   Position A   (b)   Position B   (c)   Position C   (d)   Position D

25. A student is programming the game "Flow Free". They create a 2D integer array called "answer" that records the solution to the level. The middle memory diagram shows the answer for this level. The user's current moves are stored in another 2D integer array called "guess".

Level Solution	answer (2D integer array)	guess (2D integer array)

Make a boolean method that receives the answer array and the guess array as parameters. Then, return true if they match and false if they do not.

26. This is a Base 3 system, with one quirky aspect.
   It's symbols represent -1(∅), 0(○) and +1(⊕).
   Fill in the table to count from 1 to 20.

	27	9	3	1
1				
2				
3			⊕	○
4				
5				
6				
7				
8		⊕	○	∅
9				
10				

	27	9	3	1
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

27. Make this code more efficient (there is more than one thing that needs to be done).

```java
public class muffins
{
    public static void main (String args [])
    {
        new muffins ();
    }


    public muffins ()
    {
        int amt = IBIO.inputInt ("How many muffins would you like? ");
        if (amt > 0 && amt < 10)
        {
            double cost1 = .75;
            double total = cost1 * amt;
            System.out.println ("The cost of each muffin is $" + cost1);
            System.out.println ("The cost of the total muffins is $" + total);
        }
        if (amt >= 10 && amt < 20)
        {
            double cost1 = .65;
            double total = cost1 * amt;
            System.out.println ("The cost of each muffin is $" + cost1);
            System.out.println ("The cost of the total muffins is $" + total);
        }
        if (amt >= 20 && amt < 30)
        {
            double cost1 = .55;
            double total = cost1 * amt;
            System.out.println ("The cost of each muffin is $" + cost1);
            System.out.println ("The cost of the total muffins is $" + total);
        }
        if (amt >= 30)
        {
            double cost1 = .45;
            double total = cost1 * amt;
            System.out.println ("The cost of each muffin is $" + cost1);
            System.out.println ("The cost of the total muffins is $" + total);
        }
    }
}
```

28. Write a loop to determine the value of this continued fraction:

$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+....+\cfrac{1}{2}}}}$$

Some hints and useful information.
You can approximate the answer of a continued fraction by calculating it to a large number layers and then printing out the result.

Layer 1: $1+\dfrac{1}{2}$ Layer 2: $1+\cfrac{1}{1+\cfrac{1}{2}}$ *or* $1+\dfrac{1}{Layer1}$ Layer 3: $1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{2}}}$ *or* $1+\dfrac{1}{Layer2}$

29. When asked, the user provides a number. A picture is then produced.

Here are three runs of the program:

What number? 1	What number? 2	What number? 5
1	1	1
	22	22
	1	333
		4444
		55555
		4444
		333
		22
		1

Code the program that produces this output.