(1) (10 pts) What is the output of the following program?

```java
public class FirstProgram{
    public static void main(String[] args){
        int a=1, b=2;
        a++;
        b += a;
        if (b==4)
            a++;
        else
            a--;
        System.out.println (a + "\n" + b);
    }
}
```

Output:
3
4

(2) (10 pts) What is the output of the following program?

```java
public class SecondProgram{
    public static void main(String[] args){
        String s = "Happy Birthday", t, u;
        t = s.toUpperCase();
        u = t.concat(" to you!");
        System.out.println(u);
    }
}
```
Output:
HAPPY BIRTHDAY to you!

(3) (10 pts) What is the output of the following program?

```java
public class ThirdProgram{
    public static void main (String[] args){
        for (int i=1; i<=3; i++){
            for (int j=1; j<=4; j++)
                System.out.print("*");
            System.out.println();
        }
    }
}
```

Output:
****
****
****

(4) (15 pts) Write a Java program which prompts the user for a number $x$, and then prints out the value $\sqrt{x^2 + 1}$ to the screen.

**Solution:**

```java
import java.util.Scanner;
public class Problem4{
    public static void main(String[] args){
        double x;
        Scanner scan = new Scanner(System.in);
        System.out.print("Enter a number: ");
        x = scan.nextDouble();
        System.out.println(Math.sqrt(x*x+1));
    }
}
```

(5) (2 pts each) Multiple choice (circle the correct answer)
(a) A megabyte consists of approximately how many bytes?
   (i) 1024
   (ii) 1000
(iii) one million
(iv) one billion

(b) Assume page is an object of class Graphics. Then the method call to draw a circle of radius 50 centered at (100, 150) is

(i) page.drawOval(100,150,50,50);
(ii) page.drawOval(50,50,100,150);
(iii) page.drawOval(50,100,50,50);
(iv) page.drawOval(100,150,50);

(c) Let a and b be double type variables. The mathematical expression \( \frac{1}{ab + 2} \) can be written in Java as

(i) \( \frac{1}{ab+2} \)
(ii) \( \frac{1}{ab+2} \)
(iii) \( \frac{1}{a*b+2} \)
(iv) \( \frac{1}{a*b+2} \)

(d) The char constant representing the lower-case letter a is

(i) a
(ii) 'a'
(iii) "a"
(iv) None of the above

(e) Each of the following is a valid Java identifier EXCEPT

(i) _23a
(ii) if
(iii) variable_name
(iv) X14

(f) This expression evaluates to 20 in Java

(i) 4(5)
(ii) 4/5 + 20
(iii) 3*5 + 6
(iv) 40 % 2

(g) All of the following are examples of software EXCEPT

(i) compiler
(ii) ROM
(iii) operating system
(iv) your program Program1.java

(h) The floating-point number one third is represented by this Java expression.

(i) 1/3
(ii) 1%3
(iii) 1./3.
(iv) 1.%3.

(i) _______ is a programming language only one level above machine language.
   (i) Assembly language
   (ii) Java
   (iii) Executable file
   (iv) Object-oriented language

(j) The following piece of code prints out YES to the screen if the int variable a is equal to 4 and does nothing if a is not equal to 4.
   (i) if (4==a);
    System.out.println("YES");
   (ii) if (4=a)
    System.out.println("YES");
   (iii) if (4==a)
    System.out.println("YES");
   (iv) if (4==a);
    else System.out.println("YES");

(6) (2 pts each) True/False. Circle T or F to the left of each expression.
   T  F Register is a type of memory.
   T  F In a Java program, a++ always has exactly the same meaning as ++a.
   T  F Bugs Bunny is an object of the class Cartoon Character.
   T  F US President is an object of the class Barack Obama.
   T  F Java is an object-oriented programming language.

(7) (2 pts each) Fill in the blanks:
   (a) Each byte represents 8 bits.
   (b) The value of the variable a after the following code fragment executes is 10.
      int a = 5;
      a = a*2;
   (c) The value of the Java expression 17%5 is 2.