Practice Problems: Variables and Expressions

1. Understanding code
Draw a representation of what the computer's memory looks like at the end of each of these programs:

```
public class Expressions-Declarations {
    public static void main(String [] args) {
        int x;
        double y;
        String s;
    }
}
```

```
public class Expressions-Assignment {
    public static void main(String [] args) {
        int x = 7;
        int y = 9;
        double z = x;
        x = 8;
        y = y + 3;
    }
}
```

```
public class Expressions-IntDiv {
    public static void main(String [] args) {
        int x = 3;
        double y = x / 4;
    }
}
```

```
public class Expressions-OrderOfOps {
    public static void main(String [] args) {
        int x = 1 + 2 * 3 - 4;
    }
}
```
public class Expressions-Modulus {
    public static void main(String[] args) {
        int x = 3;
        int y = 7 % x;
        int z = x % 2;
        y = y % 1;
        z = x % 0;
    }
}

The last instruction causes a DivisionByZeroException.

public class Expressions-TypeConversions {
    public static void main(String[] args) {
        double x = 1.0;
        double y = 1;
        double z = y + 1;
        x = 1 / z;
        int a = (int) x;
        a = a + x;
    }
}

Last instruction causes a TypeCastException!

public class Expressions-StringConcatenations {
    public static void main(String[] args) {
        String s = "hello";
        String t = "115";
        s = s + 9.5;
        t = t + 10;
        t = t + "5";
    }
}

public class Expressions-WithPrintln {
    public static void main(String[] args) {
        String s = "hello";
        String t = "115";
        int a = 7 / 3;
        double d = 6.0 / a;
        System.out.println(s + " again " + a);
        System.out.println(d + a);
        System.out.println("what is a? " + a);
    }
}
import java.util.Scanner;
public class ExpressionsScanner {
    public static void main(String[] args) {
        Scanner kb = new Scanner(System.in);
        int x = kb.nextInt();
        double y = kb.nextDouble();
        String s = kb.next();
        System.out.println(s + y + z);
    }
}

2. Writing Java Programs with Expressions
Write statements to put inside the main method that answer each of the following questions.

a. Create an int variable to store the number 7. Create a double to the same value as the int, converted to a double.

    // Since the problem only asks you to write the statements inside the main
    // method, you don't need the first 2 or last 2 lines here.
    // I'm including them just to be completely clear.
    public class StoreNums {
        public static void main(String[] args) {
            int myInt = 7;
            double myDouble = myInt;
        }
    }

b. Create a Scanner variable to read numbers from the keyboard. Read an int from the keyboard, and store it in a variable. Read a String from the keyboard, and store it in a variable. Print both variables to the screen.

    import java.util.Scanner;
    public class PrintNumAndString {
        public static void main(String[] args) {
            Scanner scan = new Scanner(System.in);
            int myInt = scan.nextInt();
            String myStr = scan.next();
            System.out.println(myInt);
            System.out.println(myStr);
        }
    }
c. Read in two ints from the keyboard, and print the sum to the screen.

```java
import java.util.Scanner;
public class PrintSum {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        int myInt1 = scan.nextInt();
        int myInt2 = scan.nextInt();
        System.out.println(myInt1 + myInt2);
    }
}
```