1. **Understanding code**

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

```java
public class Shortcut.Assignments {
    public static void main(String[] args) {
        int x = 1;
        int y = 3;
        int z = 5;
        x += y;
        y -= 2;
        z /= 2;
        x++;
        y--;
    }
}

public class Simple.While {
    public static void main(String[] args) {
        int x = 1;
        while (x < 10) {
            System.out.println("x = " + x);
            x++;
        }
    }
}

public class Infinite.While {
    public static void main(String[] args) {
        boolean b = true;
        while (b) {
            System.out.println("are we there yet?");
        }
    }
}

public class Complex.Update {
    public static void main(String[] args) {
        int x = 2;
        while (x < 1000) {
            System.out.println("x = " + x);
            x = x * x;
        }
    }
}
```
public class While-With-Nested-If {
    public static void main(String [] args) {
        int x = 1;
        while(x < 100) {
            System.out.println("x = " + x);
            if(x % 2 == 0) {
                x++; // If x is even, increment x by 1.
            } else {
                x *= 2; // If x is odd, multiply x by 2.
            }
        }
    }
}

public class Simple-For {
    public static void main(String [] args) {
        for(int i = 0; i < 10; i++) {
            System.out.println("i = " + i);
        }
    }
}

public class Infinite-For {
    public static void main(String [] args) {
        for( ; true; ) {
            System.out.println("are we there yet?");
        }
    }
}

public class Complex-Update-For {
    public static void main(String [] args) {
        for(int i = 2; i < 100; i = i * i) {
            System.out.println("i = " + i);
        }
    }
}

2. Writing Java Programs with Loops
   a. Write a program that reads in an int from the keyboard, and stores the int in a variable x. Then write a loop that prints "Hello, world!" to the screen x times.

   b. Write a program that reads an int N from the keyboard, and prints out all of the squares between 1 and N². For instance, if the user enters 3 for N, the program should display this on the screen:
      
      1 * 1 = 1
      2 * 2 = 4
      3 * 3 = 9