User Input Checking Examples

**Objective:** Create a segment of code that will check user input for an integer that is between 4 and 10. If the user types in something other than an integer the program should print an error message and ask for the input again. If the user types in an integer outside that range the program should print out another error message and ask for the input again. The program should ask for input until the user types in an integer between 4 and 10.

**Solution:** Solve the problem one step at a time, first get the integer input checking working and then deal with the range checking.

**Step 1:** Get the computer to not crash on a non integer input.

```java
import java.util.Scanner;

public class UserInputChecking {
    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        int num = 0;

        try {
            System.out.print("Input an integer between 4 and 10: ");
            num = keyboard.nextInt();
        } catch (Exception e) {
            System.out.println("Input is not an integer, try again.");
        }

        System.out.println(num);
    }
}
```

**Runs:**

Input an integer between 4 and 10: 6.3
Input is not an integer, try again.
0

Input an integer between 4 and 10: 5
5

Input an integer between 4 and 10: 68
68
Step 2: Put this in a loop so that the input is asked for until the user types in an integer.

```java
import java.util.Scanner;

public class UserInputChecking {
    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        boolean goodinput = false;
        int num = 0;

        do {
            try {
                goodinput = true;
                System.out.print("Input an integer between 4 and 10: ");
                num = keyboard.nextInt();
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                goodinput = false;
                String clear = keyboard.nextLine();
            }
        } while (!goodinput);

        System.out.println(num);
    }
}
```

Run:

Input an integer between 4 and 10: 3.6
Input is not an integer, try again.
Input an integer between 4 and 10: 2.3
Input is not an integer, try again.
Input an integer between 4 and 10: 25
25
Step 3: Add in range checking, easy to do since the framework has already been set up.

```java
import java.util.Scanner;

public class UserInputChecking {

    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        boolean goodinput = false;
        int num = 0;

        do {
            try {
                goodinput = true;
                System.out.print("Input an integer between 4 and 10: ");
                num = keyboard.nextInt();
                if ((num < 4) || (num > 10)) {
                    System.out.println("Input is not between 4 and 10, try again.");
                    goodinput = false;
                }
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                goodinput = false;
                String clear = keyboard.nextLine();
            }
        } while (!goodinput);

        System.out.println(num);
    }
}
```

Run:

Input an integer between 4 and 10: 6.3
Input is not an integer, try again.
Input an integer between 4 and 10: 2
Input is not between 4 and 10, try again.
Input an integer between 4 and 10: 6
6
Step 4: Although the problem has been solved, we can make it better. Place it in a function so that it can be used multiple times for different variable inputs.

```java
import java.util.Scanner;

public class UserInputChecking {
    public static int getIntreger4to10() {
        Scanner keyboard = new Scanner(System.in);
        boolean goodinput = false;
        int num = 0;
        do {
            try {
                goodinput = true;
                System.out.print("Input an integer between 4 and 10: ");
                num = keyboard.nextInt();
                if ((num < 4) || (num > 10)) {
                    System.out.println("Input is not between 4 and 10, try again.");
                    goodinput = false;
                }
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                goodinput = false;
                String clear = keyboard.nextLine();
            }
        } while (!goodinput);
        return num;
    }

    public static void main(String[] args) {
        int num1 = getIntreger4to10();
        int num2 = getIntreger4to10();
        int num3 = getIntreger4to10();
        System.out.println(num1 + " " + num2 + " " + num3);
    }
}
```

Run:

```
Input an integer between 4 and 10: 6.3
Input is not an integer, try again.
Input an integer between 4 and 10: 5
Input an integer between 4 and 10: 56
Input is not between 4 and 10, try again.
Input an integer between 4 and 10: 2
Input is not between 4 and 10, try again.
Input an integer between 4 and 10: 4
Input an integer between 4 and 10: 9
5 4 9
```
Step 5: Do a better job with the user interface. Add a parameter to change the input message so the user knows which number they are inputting.

```java
import java.util.Scanner;

public class UserInputChecking {

    public static int getIntreger4to10(String message) {
        Scanner keyboard = new Scanner(System.in);
        boolean goodinput = false;
        int num = 0;
        do {
            try {
                goodinput = true;
                System.out.print("Input the integer "+ message + " between 4 and 10: ");
                num = keyboard.nextInt();
                if ((num < 4) || (num > 10)) {
                    System.out.println("Input is not between 4 and 10, try again.");
                    goodinput = false;
                }
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                goodinput = false;
                String clear = keyboard.nextLine();
            }
        } while (!goodinput);
        return num;
    }

    public static void main(String[] args) {
        int num1 = getIntreger4to10("Number 1");
        int num2 = getIntreger4to10("Number 2");
        int num3 = getIntreger4to10("Number 3");
        System.out.println(num1 + " + " + num2 + " + " + num3);
    }
}
```

Run:

Input the integer Number 1 between 4 and 10: 3
Input is not between 4 and 10, try again.
Input the integer Number 1 between 4 and 10: 6.5
Input is not an integer, try again.
Input the integer Number 1 between 4 and 10: 5
Input the integer Number 2 between 4 and 10: 12
Input is not between 4 and 10, try again.
Input the integer Number 2 between 4 and 10: 15
Input is not between 4 and 10, try again.
Input the integer Number 2 between 4 and 10: 5.5
Input is not an integer, try again.
Input the integer Number 2 between 4 and 10: 9
Input the integer Number 3 between 4 and 10: 4
5 9 4
Step 6: Generalize so that the function can be used for different range restrictions. Add two more parameters that allow the programmer to set the lower and upper bounds on the range of possible values.

```java
import java.util.Scanner;

public class UserInputChecking {
    public static int getIntregerAtoB(String message, int a, int b) {
        Scanner keyboard = new Scanner(System.in);
        boolean goodinput = false;
        int num = 0;
        do {
            try {
                goodinput = true;
                System.out.print("Input the integer " + message + " between " + a + " and "+ b + ": ");
                num = keyboard.nextInt();
                if ((num < a) || (num > b)) {
                    System.out.println("Input is not between " + a + " and "+ b + ", try again.");
                    goodinput = false;
                }
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                goodinput = false;
                String clear = keyboard.nextLine();
            }
        } while (!goodinput);
        return num;
    }

    public static void main(String[] args) {
        int num1 = getIntregerAtoB("Number 1", 2, 10);
        int num2 = getIntregerAtoB("Number 2", 30, 40);
        int num3 = getIntregerAtoB("Number 3", 1, 5);
        System.out.println(num1 + "  " + num2 + "  " + num3);
    }
}
```

Run:

Input the integer Number 1 between 2 and 10: 3.6
Input is not an integer, try again.
Input the integer Number 1 between 2 and 10: 1
Input is not between 2 and 10, try again.
Input the integer Number 1 between 2 and 10: 5
Input the integer Number 2 between 30 and 40: 21
Input is not between 30 and 40, try again.
Input the integer Number 2 between 30 and 40: 35.9
Input is not an integer, try again.
Input the integer Number 2 between 30 and 40: 35
Input the integer Number 3 between 1 and 5: -5
Input is not between 1 and 5, try again.
Input the integer Number 3 between 1 and 5: 3.6
Input is not an integer, try again.
Input the integer Number 3 between 1 and 5: 3
Input the integer Number 3 between 1 and 5: 3
**Step 7:** Although the above examples are good exercise in the use of boolean variables you may notice that for this problem one does not need to use the boolean. It can be removed by altering the while statement as follows.

```java
import java.util.Scanner;

public class UserInputCheckSave2 {
    public static int getIntregerAtoB(String message, int a, int b) {
        Scanner keyboard = new Scanner(System.in);
        int num = 0;
        do {
            try {
                System.out.print("Input the integer " + message + " between " + a + " and " + b + ": ");
                num = keyboard.nextInt();
                if ((num < a) || (num > b)) {
                    System.out.println("Input is not between " + a + " and " + b + ", try again.");
                }
            } catch (Exception e) {
                System.out.println("Input is not an integer, try again.");
                String clear = keyboard.nextLine();
            }
        } while ((num < a) || (num > b));
        return num;
    }

    public static void main(String[] args) {
        int num1 = getIntregerAtoB("Number 1", 2, 10);
        int num2 = getIntregerAtoB("Number 2", 30, 40);
        int num3 = getIntregerAtoB("Number 3", 1, 5);
        System.out.println(num1 + "  " + num2 + "  " + num3);
    }
}
```

**Run:**

Input the integer Number 1 between 2 and 10: 5.3
Input is not an integer, try again.
Input the integer Number 1 between 2 and 10: 6.2
Input is not an integer, try again.
Input the integer Number 1 between 2 and 10: 89
Input is not between 2 and 10, try again.
Input the integer Number 1 between 2 and 10: 5
Input the integer Number 2 between 30 and 40: 20
Input is not between 30 and 40, try again.
Input the integer Number 2 between 30 and 40: 35
Input the integer Number 3 between 1 and 5: -2.3
Input is not an integer, try again.
Input the integer Number 3 between 1 and 5: 2
5  35  2