Task 0 – Prepare the Lab Work Environment

1. Use SmartCVS to check out your working environment to a folder named `cvsroot` in the root folder of your N: drive or in the root folder of your USB flash drive.

2. Minimize the SmartCVS windows and use My Computer to navigate from the `cvsroot` folder to your w-number folder. Create a folder named `lab3` in your w-number folder and open it. Use this folder to store programs from the following tasks.

Task 1 - Evaluating logical expressions.

1. Examine the following program.

```java
import acm.program.*;
import acm.graphics.*;
import acm.io.*;

class Lab3P1 extends Program {

    void main()
    {
        println("a. "+((3 > 7) && (2 < 0) || (6 == 3 + 3)));
        println("b. "+((3 > 7) && (2 < 0) || (6 == 3 + 3)));
        println("c. "+((3 > 7) && ((2 < 0) || (6 == 3 + 3)));
        println("d. "+(!(((-4.2 != 3.0) && (10 < 20))));
        println("e. "+((!((-4.2 != 3.0) || (! (10 < 20))));
    }

    public static void main(String[] args)
    {
        new Lab3P1().start();
    }
    public void run() { main(); }
}
```

2. Before you run this program, go through it and see if you can determine what each `println` statement will print. Record your answers below.

   a. ________________
   b. ________________
   c. ________________
   d. ________________
   e. ________________

3. Download Lab3P1.java from the lab3 folder in the files area of the class website. Run the program and compare the actual results with your answers. If there are differences, be sure that you understand why you made a mistake. Correct any mistakes in your results recorded above by STRIKING THROUGH the incorrect answer (NOT BY erasing) and writing the correct answer.
Task 2 - Simple and compound statements.

1. Examine the following program:

```java
import acm.program.*;
import acm.graphics.*;
import acm.io.*;

class Lab3P2 extends Program
{
    void main()
    {
        int number;
        number = readInt("Enter an integer and press RETURN. ");
        if (number > 0)
        {
            println("The number is " + number );
            println("The number squared is " + number*number);
            println("The number cubed is " + number*number*number);
        }
    
    public static void main(String[] args)
    {
        new Lab3P2().start();
    }
}

public void run() { main(); }
}
```

2. Before you run this program, go through it and see if you can determine what will print if `number` is 7. What will print if `number` is -7? Record your answers below.

   Results when number is 7   Results when number is -7
   ___________________________________   ___________________________________
   ___________________________________   ___________________________________
   ___________________________________   ___________________________________

3. Download Lab3P2.java from the lab3 folder in the files area of the class website. Run the program and compare the actual results with your answers. If there are differences, be sure that you understand why you made a mistake. Correct any mistakes in your results recorded above by STRIKING THROUGH the incorrect answer (NOT BY erasing) and writing the correct answer.

4. Change the program so that it looks like this:

```java
import acm.program.*;
import acm.graphics.*;
import acm.io.*;

class Lab3P2 extends Program
{
    void main()
    {
        int number;
        number = readInt("Enter an integer and press RETURN. ");
        if (number > 0)
        {
            println("The number is " + number );
            println("The number squared is " + number*number);
            println("The number cubed is " + number*number*number);
        }
    
    public static void main(String[] args)
    {
        new Lab3P2().start();
    }
}
```

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5. Before you run this program, go through it and see if you can determine what will print if \texttt{number} is 7. What will print if the variable \texttt{number} is -7? Record your answers below.

\begin{tabular}{l|l}
\textbf{Results when number is 7} & \textbf{Results when number is -7} \\
\hline
\hline
\end{tabular}

6. Run the program and compare the actual results with your answers. If there are differences, be sure that you understand why you made a mistake. Correct any mistakes in your results recorded above by \textbf{STRIKING THROUGH} the incorrect answer (NOT BY erasing) and writing the correct answer.

4. Open SmartCVS and refresh so that you can see \textit{Lab3P2.java and Lab3P2.class}. Add them to CVS control, and then commit both with the comment “Task 2 complete”.

\textbf{Task 3 – Working with graphic objects and if-else chains.}

1. Download Lab3P3.java from the lab3 folder in the files area of the class website.

```java
import acm.program.*;
import acm.graphics.*;
import acm.io.*;

class Lab3P3 extends GraphicsProgram {

    void main() {
        int diameter, dieRoll;
        GOval shape;
        dieRoll = (int)(Math.random() * 3) + 1;
        diameter = readInt("What is the diameter of the circle? ");
        shape = new GOval(0, 0, diameter, diameter);
        add(shape);
        shape.setFilled(true);
        if (dieRoll == 1)
            shape.setFillColor(ORANGE);
        else if (dieRoll == 2)
            shape.setFillColor(GREEN);
        else
            shape.setFillColor(MAGENTA);
    }

    public static void main(String[] args) {
        new Lab3P3().start();
    }

    public void run() { main(); }
}
```

3. Run the program and see what it does.

4. Put quotation marks (") around all the colors. For example, one line would now read:

```
shape.setFillColor("ORANGE");
```

Attempt to compile, and observe the errors that result. Why do you suppose this is an error?

Correct the program so that it runs correctly again, and continue.
5. Comment out the setFilled call. It should now read:
   // shape.setFilled(true);
   Compile and run the program. What happens?

   Correct the program so that it runs correctly again, and continue.

6. Modify the program to ask for a length and width, and create a rectangle instead of an oval. Run the new version and make sure that it works.

7. Further modify the program to generate a die roll of 1 thru 6, and use the additional numbers 4 thru 6 for three new colors (pick from the remaining available colors: BLACK, BLUE, CYAN, DARK_GRAY, GRAY, LIGHT_GRAY, PINK, RED, WHITE, YELLOW). Run the new version several times, to make sure that all your colors are being used.

8. Open SmartCVS and refresh so that you can see Lab3P3.java and Lab3P3.class. Add them to CVS control, and then commit both with the comment “Task 3 complete”.

**Task 4 – Switch Statements.**

1. Modify the program from Task 3 to use a switch statement instead of an if-else chain. When finished, save your program as Lab3P4.java.

2. Make sure your program will compile and execute without error.

3. Open SmartCVS and refresh so that you can see Lab3P4.java and Lab3P4.class. Add them to CVS control, and then commit both with the comment “Task 4 complete”.

**Task 5 – Turn in your answers.**

1. Make sure you have answered all the questions on this lab handout. Then staple the pages together, write your name on the top, and turn them in to the instructor. Your programs should have already been submitted through the CVS system.