## CS1110 Lab 01. Expressions, variables, declarations, assignments Spring 2010

Name _____ Cornell net id _____

This introductory lab deals with Java expressions and assignment statements, for the most part treating Java just as a calculator.

Below is a list of expressions, some followed by questions. Type each expression into the Interactions pane in DrJava, hit the enter key to have it evaluated, record its value on this sheet (next to the expression), and answer any questions to the best of your ability. Do not simply write down what you think is the value of an expression; write down only what DrJava says it is. To save space, some of the rows have expressions in both columns, in which case, do the left-column one first, then the right-column one.

To save time and prevent mistakes, you can cut and paste from the online pdf or html version of this handout (available from the course webpage) rather than typing the expressions in directly. Also, you can use the up-arrow key to obtain a previous expression; then you can edit the expression and hit the return key to have the modified expression evaluated.

You may also find it convenient to enlarge the Interactions pane. To do this, put the mouse on the dotted horizontal bar running across the entire window; the cursor should become a double-headed vertical arrow. Hold down the mouse button and drag the bar upwards.

When finished, show this sheet to your lab instructor, who will record that you did it. If you do not finish during the lab, finish it within the next few days and show it to your lab instructor next week. This paper is yours to keep.

Don't waste time! If you don't understand something, ask your lab instructor or a consultant immediately! You should understand HOW each expression is evaluated, so if an answer doesn't make sense, ask someone. The lab instructors and consultants are in the lab to help. They will look over your shoulder from time to time and give you advice.

| **INT EXPRESSIONS** | 5 + 2 |
|---|---|
| 5 + 2 * 5 | (5 + 2) * 5 |
| 4 - 3 - 3 | 4 - (3 - 3) |
| -4 - -4 - -4 | |
| 6 / 2 | |
| 6 / 4 | Why isn't 6/4 = 1.5? |
| 7 % 2 | 8 % 3 |
| 6 % 3 | What is the name of operator %? |
| Integer.MIN_VALUE | Integer.MIN_VALUE + 1 |
| Integer.MIN_VALUE - 1 | Why does Integer.MIN_VALUE - 1 have such a funny value? |
| Integer.MAX_VALUE | Integer.MAX_VALUE - 1 |
| Integer.MAX_VALUE + 1 | |

| **DOUBLE EXPRESSIONS** | 1 + 1.99 |
|---|---|
| 5.0 + 2.0 | (5 + 2.1) * 5 |
| 4.0 - 3 - 3 | 4.0 - (3 - 3) |
| 6.0 / 2 | 6.0 / 4 |
| 6.0 % 3 | 6 % 4 |
| -6.0 % 3 | -6.0 % 4 |
| Double.MIN_VALUE | Double.MIN_VALUE - 1 |
| Double.MAX_VALUE | Double.MAX_VALUE + 1 |
| Double.MAX_VALUE + Double.MAX_VALUE | |

| **CASTING** | |
|---|---|
| (**double**) 4 | (**int**) 4 |
| (**double**) 7 / 4 | (**double**) (7 / 4) |
| Which operator has higher precedence, casting or division? (deducible from the row above) | |
| (**int**) 5.3 | (**double**) (**int**) 5.3 |
| (**int**) (**int**) 5.3 | (**double**) (**double**) 4 |
| (**int**) -5.3 | |
| 5 + 7 / 4 | (**double**) 5 + 7 / 4 |
| 5 + 7 / (**double**) 4 | (**double**) (10 + 14/8) |

| **FUNCTION CALLS** | |
|---|---|
| Math.min(25, 4) | (Note: In the function call on the left, the two constants 25 and 4 are called the **arguments** of the call.) |
| Math.max(25, 4) | Math.min(25, Math.max(27, 4)) |
| Math.abs(25) | Math.abs(- 25) |
| Math.ceil(25.6) | Math.floor(25.6) |
| Math.ceil(- 25.6) | Math.floor(- 25.6) |
| Math.abs(Math.min(-25, -4)) | |

| **BOOLEAN EXPRESSIONS** | |
|---|---|
| **true** | **true** && **false** |
| **true** && **true** | What is the name of operator && ? |
| **false** | **true** \|\| **false** |
| **true** \|\| **true** | What is the name of operator \|\| ? |
| !**true** | What is the name of operator ! ? |
| !**false** | !!**false** |
| **true** && **false** && **true** | **true** \|\| **false** \|\| **true** |
| **true** \|\| (**false** && **true**) | **true** && (**true** \|\| **false**) |
| 3 < 5 | 3 < 5 && 5 < 3 |
| **false**&& (5 / 0 == 1) | (5 / 0 == 1) && **false** |
| Why does the lefthand expression above work whereas the righthand one doesn't? | |

| **STRING EXPRESSIONS** | |
|---|---|
| "Truth " + "is " + "best" | ("Truth " + "is ") + "best" |
| "Truth " + ("is " + "best") | 56 + "" + 56 |
| "" + 4 / 2 | ("" + 4) / 2 gives an error message. Why? |
| "" + (4 / 2) | What does + do if at least one operand is a String? |
| 4 + 2 + "" | 4 + (2 + "") |

**VARIABLES, DECLARATIONS, ASSIGNMENTS**

It is important that you learn the difference between a declaration and an assignment statement.

In Java, variables must be declared before they are used. In the newest version of DrJava, in the interactions pane, variables must be declared before they are used. You can change this to allow uses of variables without declarations. Use menu item Edit->Preferences; in the window that opens, click on "Interactions pane" in the left column and then uncheck the appropriate box.

To the right, write the purpose of a declaration
like "**int** j;".

To the right, explain how the assignment statement
"j= j + 5;" is executed.

| | |
|---|---|
| int j; | (There will be no answer from the declaration to the left) |
| int j; | What happens when you try to declare a variable twice? (May vary depending on which version of DrJava you are using.) |
| j | Does a newly declared variable have a value? |
| j= 2; | (To the left is your first assignment statement) |
| j | j+4 |
| j= j + 9; | |
| j | (You can see what assigning to j did) |
| int k= 5; | j + k |
| double w= j + k; | w |
| w; | (if you follow an expression with a semicolon, you don't see its value) |