***Homework Problems 3***

1. What values are assigned to b1, b2, b3, and b4 by the following code? Run the code to check your answers.

byte b1, b2, b3, b4;  
int i = 3, j = 258;  
double x = 4.999, y = 4.0E2;

b1 = (byte)i;

b2 = (byte)j;

b3 = (byte)x;

b4 = (byte)y;

1. Incorporate the code below in a program and compile. Why is there a compile-time error?

int x;

x = 999999999999;

1. Incorporate the code below in a program and compile. Why is there a compile-time error?

float x;

x = 2.0;

1. Why do the first and third println statements below display different values? Why do the second and fourth println statements display different values.

int x = 1;

System.out.println(x == 2);  
 System.out.println(x);

System.out.println(x = 2);

System.out.println(x);

1. What is displayed by the following statement:

System.out.println(100.0 + 50/4);

1. Run a program with the code below to determine if it is legal to concatenate two char constants, or to concatenate a char constant to a string.

System.out.println('a' + 'b'); // is this legal?

System.out.println('\'a' + "bcd"); // is this legal?

1. Write a program that initializes the int variables x, y, and z to 1, 2, and 3, respectively, and then executes

x = y = z;

From the values assigned to x, y, and z, determine the order in which the assignments occur. Left to right or right to left? Is the assignment operator left or right associative?

1. Is it legal to assign a char value to an int variable with a cast? For example, is the following code legal?

int i;

i = (int)'A'; // is this legal?

What value is assigned to i? Is the cast required? Is it legal to assign an int value to char variable with a cast? Is a cast required? Run a test program to check your answers.

1. What is the effect of the following code:

char c = 'N';  
 c = (int)'a' – (int)'A' + (int)c;

System.out.println(c);

Run a test program to check your answer. The code for every lowercase letter is 32 more than the code for the corresponding uppercase letter. Thus, (int)'a' – (int)'A' is equal to 32. If you add 32 to the character 'N', what character do you get?

1. Is it legal to cast a boolean constant to int. For example, is the following statement legal:

int i;

i = (int)true;

Run a test program to check your answer. If the code is legal, display the value assigned to i, and then repeat using the boolean constant false in place of true.

1. Write a program that determines if the value of x is less than 1 or greater than 10. If it is, your program should display true; otherwise, it should display false. Test your program for x equal to -3, 1, 5, 10, and 20.
2. Write a program that assigns 1.2345 to x, and then extracts from x and separately displays its integer part and its fractional part. x should have type double.
3. Write a program that computes and displays (with an appropriate label) the exact average of 1, 2, 3, and 4 (the correct answer is 2.5).
4. Write a program that outputs the truth table for the && operator. Use the && operator in your program to determine the values of p && q that appear in your table. For example, to display the value of && when both operands are false, use

System.out.println("false false " + false && false);

Do *not* use

System.out.println("false false false");

Your output should look like this:

p q p && q

false false false

false true false

true false false

true true true

1. Write a program that computes and displays the truth table for !(p && q). Use the technique described in homework problem 14. .
2. Write a program that computes and displays the truth table for !p || !q . Use the technique described in homework problem 14. Compare with your results from homework problem 15. The equivalence of

!(p && q) and !p || !q is one of **DeMorgan's Laws** (see homework problem 18 for the other DeMorgan's

Law).

1. Write a program that computes and displays the truth table for !(p || q). Use the technique described in homework problem 14.
2. Write a program that computes and displays the truth table for !p && !q. Use the technique described in homework problem 14. Compare with your results from homework problem 17. The equivalence of !(p || q) and !p && !q is one of **DeMorgan's Laws**.
3. Same as homework problem 14, but for the ^ (exclusive OR) operator. How does it differ from ||?
4. charAt is a method in a String object that returns the character at the specified position. For example, if c is type char and s is a reference variable to a String object, then the following assignment statement assigns c the first character in the String object to which s points:

c = s.charAt(0);

Write a program in which you assign "AB3cd$" to s. Display each character in this string on a separate line. Display all the letters in uppercase. Thus, your program should display AB3CD$, one character per line. Your program should work for any five-character string. Do not use the toUpperCase method. *Hint*: See homework problem 9.

1. compareTo is a method in a String object that compares two strings for equality. If the first string precedes alphabetically the second string, compareTo returns a negative integer. If the two strings are equal, it returns 0. If the first string follows alphabetically the second string, it returns a positive integer. What does compareTo return for

s1.compareTo(s2)

for the following pairs of s1 and s2:

"AAA", "AAA"

"AAA", "aAA"

"aAA", "AAA"

"AAA", "aAA"

"AAA", "AAAA"

"AAA", "AAA "

"CAA", "AAA"

"AAA", "CAA"

"000", "333"

"000", "AAA"

"???", "AAA"