Assignment 3: Evaluate Expressions

In this assignment, you will practice writing Java statements that involve calling methods. Review the three example problems and then complete Parts 1 through 9.

Example Problem 1

Use Eclipse to evaluate the Java expression. Use a print statement to print the value to the console. Express your answer as a decimal.

Math.pow(4 + Math.PI, 5.2)

Solution:

Put the statement

System.out.println(Math.pow(4 + Math.PI, 5.2));

in the main method and compile run the class. The output in the console is

27525.44761161043

Example Problem 2

The logistic function is used in ecology to model population growth. The function

is an example of a logistic function.

* 1. Write a Java statement that declares and initializes a variable x of type double. Initialize the variable x to a value greater than 10 of your choice.
  2. Write a Java statement that declares and initializes a variable population of type double. The statement should use the formula above to calculate the value of payment.

NOTE: The statement in Part b should be written so that the value of the variable population is calculated correctly for any value of the variable x. In other words, if the value of x in the statement from Parts a is changed, the statement in Part b should give the correct value of population without any changes. Do not use the literal values you choose in Part a in the formula in Part b.

Solution:

double x = 12.4;  
double population = 5 / (1 + Math.exp(-2 \* (x - 3)));

Example Problem 3

1. Write a Java statement that declares and initializes a variable w1 of type String. Initialize w1 to a string of even length of length at least two of your choice.
2. Write a Java statement that declares and initializes a variable w2 of type String. Use string methods to initialize w2 to be the string consisting of the first half of the string w1 followed by the last character of the string w1. For example, if w1 is “whatever”, the value of w2 should be “whatr”.

NOTE: The statement in Part b should be written so that the value of the variable w2 is calculated correctly for any value of the variable w1. In other words, if the value of w1 in the statement from Part a is changed, the statement in Part b should give the correct value of w2 without any changes. Do not use the literal value you choose in Part a in the statement in Part b.

Solution:

String w1 = "whatever";  
String w2 = w1.substring(0, w1.length() / 2) + w1.charAt(w1.length() - 1);

1. Use Eclipse to evaluate the Java expression. Use a print statement to print the value to the console. Express your answer as a decimal.

Math.sqrt(1+2+3+4)

1. Use Eclipse to evaluate the Java expression. Use a print statement to print the value to the console. Express your answer as a decimal.

Math.exp(-Math.pow(Math.sin(1), 0.25))

1. In probability and statistics, the value of the standard normal distribution y can be calculated using the formula

where x is any real number.

* 1. Write a Java statement that declares and initializes a variable named x of type double. Initialize the variable x to a value of your choice.
  2. Write a Java statement that declares and initializes a variable named y of type double. The statement should use the formula above to calculate the value of the variable y.

NOTE: The statement in Part b should be written so that the value of y is calculated correctly for any value of the variable x. In other words, if the value of x in the statement from Part a is changed, this statement should give the correct value of y without any changes. Do not use the literal value you choose in Part a in the formula in Part b.

1. Heron’s formula can be used calculate the area of a triangle, given the lengths of three sides a, b, c. Heron’s formula states that the area of the triangle is given by

where s, the semi-perimeter, is given by

* 1. Write Java statements that declare and initialize three variables named a, b, and c of type double. Initialize the variables a and b to **positive** values of your choice. Initialize the variable c to a **positive value larger than both a and b, but less than a + b**.
  2. Write a Java statement that declares and initializes a variable named s of type double. The statement should use the formula for s above to calculate the value of s.
  3. Write a Java statement that declares and initializes a variable named area of type double. The statement should use the formula for area above to calculate the value of area.

NOTE: The statements in Parts b and c should be written so that the values of the variables s and area are calculated correctly for any values of the variables a, b, and c. In other words, if any of the values of a, b, or c in the statement from Part a are changed, the statements in Parts b and c should give the correct values of s and area without any changes. Do not use the literal values you choose in Part a in the formulas in Parts b and c.

1. The monthly payment of a mortgage of n months with monthly interest rate r for a principal p is given by the mathematical formula.

* 1. Write a Java statement that declares and initializes a variable p of type double. Initialize the variable p to a value greater than 75,000.
  2. Write a Java statement that declares and initializes a variable r of type double. Initialize the variable r to a value between 0.025 and 0.06.
  3. Write a Java statement that declares and initializes a variable n of type int. Initialize the variable n to a value between 120 and 360.
  4. Write a Java statement that declares and initializes a variable payment of type double. The statement should use the formula above to calculate the value of payment.

NOTE: The statement in Parts d should be written so that the value of the variable payment is calculated correctly for any values of the variables p, r, and n. In other words, if any of the values of p, r, and n in the statement from Parts a through c are changed, the statement in Parts d should give the correct value of payment without any changes. Do not use the literal values you choose in Parts a through c in the formulas in Part d.

* 1. Write a Java statement that declares and initializes a variable s1 of type String. Initialize s1 to a string of odd length of your choice.
  2. Write a Java statement that declares and initializes a variable s2 of type String. Use string methods to initialize s2 to be the substring of s1 with the center character removed. For example, if s1 is “Program”, the value of s2 should be “Program”.

NOTE: The statement in Part b should be written so that the value of the variable s2 is calculated correctly for any value of the variable s1. In other words, if the value of s1 is in the statement from Part a is changed, the statement in Part b should give the correct value of s2 without any changes. Do not use the literal value you chose in Part a in the formula in Part b.

* 1. Write a Java statement that declares and initializes a variable s3 of type String. Initialize s3 to a string of at least length two of your choice.
  2. Write a Java statement that declares and initializes a variable s4 of type String. Use string methods to initialize s4 to be the substring of s3 with the first and last characters of s3 swapped. For example, if s3 is “dog”, the value of s4 should be “god”.

NOTE: The statement in Part b should be written so that the value of the variable s4 is calculated correctly for any value of the variable s3. In other words, if the value of s3 in the statement from Part a is changed, the statement in Part b should give the correct value of s4 without any changes. Do not use the literal value you choose in Part a in the statement in Part b.

* 1. Write Java statements that declares and initializes two variable s5 and s6, both of type String. Initialize s5 and s6 to strings of even length of your choice.
  2. Write a Java statement that declares and initializes a variable s7 of type String. Use string methods to initialize s7 to be the combination of the first half of s5 and the second half of s6. For example, if s5 is “Computer” and s6 is “Programmer”, then the value of s7 should be “Compammer”.

NOTE: The statement in Part b should be written so that the value of the variables s7 is calculated correctly for any value of the variables s5 and s6. In other words, if the values of s5 or s6 in the statements from Part a are changed, the statement in Part b should give the correct value of s7 without any changes. Do not use the literal values you choose in Part a in the statement in Part b.

* 1. Write a Java statement that declares and initializes a variable fullName of type String. Initialize fullName to a string that represents a full name such as “Doe, John”. The last name should appear first, followed by a comma and a space, followed by the first name.
  2. Write a Java statement that declares and initializes a variable s8 of type String. Use string methods to initialize s8 to be the first initial of the first name stored in the variable fullName, followed by a period and a space, followed by the last name stored in the variable fullName. For example, if the value of fullName is “Doe, John”, the value of s8 should be “J. Doe”.

NOTE: The statement in Part b should be written so that the value of the variable s8 is calculated correctly for any value of the variable fullName. In other words, if the value of fullName in the statement from Part a is changed, the statement in Part b should give the correct value of s8 without any changes. Do not use the literal value you choose in Part a in the statement in Part b.