

Exercise IB Java Topic 4

- (e) indicates that the question is easy
(m) indicates that the question is moderately difficult
(q) indicates that the question is quite difficult
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Question 1. (m): (pg. 184) Solving quadratic equations using methods

We want to write a program that solves the equation $ax^2 + bx + c = 0$. The solution is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$b^2 - 4ac$ is called the discriminant. To have a real solution for x the discriminant must be zero or positive. So:

- (a) Write a method called 'discr' that calculates the discriminant and returns its value.
(b) Write the 'main' method that calls 'discr' and if the returned value is negative it displays "no real roots". Otherwise it calculates the two values of x
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Question 2. (e): (pg. 186)

A student is allowed go to a football game if the following conditions are fulfilled: homework done AND Weather is good. The following truth table illustrates this scenario.

Homework done	Weather is good	Allowed
TRUE	TRUE	TRUE
TRUE	FALSE	FALSE
FALSE	TRUE	FALSE
FALSE	FALSE	FALSE

The logic expression is Allowed = Weather is good AND Homework done

Question 3. (e): (pg. 188)

A program asks a user to enter a string and an integer. The entered string will be displayed n times. Use a 'while' loop.

Question 4. (e): (pg. 188)

A program asks a user to enter a string and an integer. The entered string will be displayed n times. Use a 'for' loop.

Question 5. (e): (pg. 189)

Write a program that given a number it outputs a string to indicate whether the number is positive, zero or negative. Do this with 'if' statements that are not nested.

Question 6. (e): (pg. 189)

Write a program that given a number it outputs a string to indicate whether the number is positive, zero or negative. Do this with nested 'if' statements.

Question 7. (m): (pg. 194)

A company has the following policy to calculate the end-of-year bonus for its employees:
If the employee has worked for the company for 9 months or more then the bonus equals to 30% of his/her monthly salary. If the employee has worked for the company for less than 9 months and his/her salary is less than €2000 then the bonus equals to 20% of his/her monthly salary. If the employee has worked for the company for less than 9 months and his/her salary is equal or more than €2000 then the bonus equals 10% of his/her monthly salary.

Question 8. (m): (pg. 201)

Write a program that declares an array of integers that contains 7 elements. The program performs the following:

- a) The user then enters the values of the elements.
- b) The program displays the values on the screen.
- c) The program adds 3 to each value.
- d) The program displays the new values on the screen.
- e) The program displays how many values are positive, how many are zero and how many are negative.
- f) The program gives the highest and smallest numbers

g) The program gives the average of the numbers.

Question 9. (q): (pg. 202)

Given an array write a program to decide whether it is symmetrical. The number of elements of the array has to be odd. If the array has an even number of elements then the program will issue a message saying that the array is not valid. In the following examples, array A is not symmetrical and array B is symmetrical.

Array A

2	12	3	5	22	7	7	12	2
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Array B

9	12	3	7	6	7	3	12	9
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Question 10. (m): (pg. 203)

An array consists of integers. Find the least distance between neighbouring elements. The distance between two values s and t is $\text{abs}(s-t)$ i.e. the absolute value of the difference (e.g. if $s=8$ and $t=15$, the absolute is 7). The absolute is always positive. `Math.abs (s-t)` gives you the absolute value of the difference between the values.
