

1 Give the value of `a` after the execution of each of the following sequences. (3)

(a) `int a = 1;`
`a = a + a;`
`a = a + a;`
`a = a + a;`

(b) `double a = 2;`
`a = a * a;`
`a = a * a;`
`a = a * a;`

(c) `boolean a = true;`
`a = !a;`
`a = !a;`
`a = !a;`

2 Why does `10 / 3` result in the value 3 instead of 3.33333333? What modifications would you need to make to ensure the value 3.33333333? (3)

3 What do each of the following print? (5)

- (a) `System.out.println(2 + "bc");`
- (b) `System.out.println(2 + 3 + "bc");`
- (c) `System.out.println((2 + 3) + "bc");`
- (d) `System.out.println("bc" + (2 + 3));`
- (e) `System.out.println("bc" + 2 + 3);`

4 A physics student gets unexpected results when using the code: (5)

$$F = G * \text{mass1} * \text{mass2} / r * r;$$

to compute values according to the formula $F = Gm_1m_2/r^2$. Explain the problem with the code and indicate how you would fix it.

5 *Rolling Dice.* Write a program that generates and prints two random integers between 1 and 6 (as if you were rolling dice). (10)

Hint: You can use `Math.random()` to generate a random number. Experiment with its output before deciding how you can use it to restrict your values to the desired results.

6 *Loan Payments.* Write a program that calculates the monthly payments you would have to make over a given number of years to pay off a loan at a given interest rate, compounded continuously. Given the number of years, t , the principal, P , and the annual interest rate, r , the total amount paid at the end of a loan is given by the formula: $A = Pe^{rt}$. (20)

Hint: Use `Math.exp(n)` to calculate e^n .