Short Answer:

Answer the following questions with complete sentences in your own words. You are encouraged to conduct your own research online or through other methods before answering the questions. If you research online, please consult multiple sources before you write down your answers. You are expected to be able to explain your answers in detail (Provide examples to each question).

1. What is Java variables and How to declare Java variables?
2. What are Java data types?
3. What are Primitive data types in Java?
4. What is wrapper class in Java and Why we need wrapper class?
5. What is the differences between passing by value and passing be reference?
6. What is an Immutable class in Java?
7. How to create a custom immutable class in Java?
8. What is String pool in Java and why we need String pool?
9. What are the results of following expressions? Please include the calculation process.
   - 5 & 6
   - 5 | 6
   - 5 ^ 6
10. Why we need to use break statement in Switch statement?
11. What are access modifiers and their corresponding scopes in Java?
12. What is static field and static method?
13. Explain the main method in Java.

Coding Questions:

Write code in Java to solve following problems. Please write your own answers. You are highly encouraged to present more than one way to answer the questions. Please follow best practice when you write the code so that it would be easily readable, maintainable, and efficient. Clearly state your assumptions if you have any. You may discuss with others on the questions, but please write your own code.

1. Develop a mathematical Calculator
   a. (2 Variables -- X=5,Y=7) -->> Add, Sub, Mul, Div
   b. (3 Variables -- X=5,Y=6,Z=7) -->> Add, Sub, Mul, Div

The input contains two array, an array of variables and an array of operators:

input1 = [5,6,14,7], input2 = [“Add”, “Sub”, “Div”]

The precedence of operator needs to be taken care of, for example, the above example should be 5 + 6 - (14 / 7) = 9 instead of (5 + 6 - 14) / 7 = 0 (if the end result is not integer, output the floor of the decimal result)

Assumption:

1. No parentheses
2. Input will always be valid
3. input2.length = input1.length - 1

2. Write a Java program to convert minutes into a number of years and days.
Test Data
Input the number of minutes: 3456789
Expected Output :
3456789 minutes is approximately 6 years and 210 days

3. Using only the programming techniques you learned in this lesson, write an application that calculates the squares and cubes of the numbers from 0 to 10 and prints the resulting values in table format, as shown below. (Build-in functions are not acceptable)

number	square	cube
0	0	0
1	1	1
2	4	8
.		
.		
10	100	1000

4. (Print a table) Write a program that displays the following table:

a	b	pow(a, b)
1	2	1
2	3	8
3	4	81
4	5	1024
5	6	15625

5.(Occurrence of max numbers) Write a program that reads integers, finds the largest of them, and counts its occurrences. Assume that the input ends with number 0. Suppose that you entered 3 5 2 5 5 5 0; the program finds that the largest is 5 and the occurrence count for 5 is 4.

Enter numbers: 3 5 2 5 5 5 0

The largest number is 5
The occurrence count of the largest number is 4

6. Given a **non-empty** array of integers `nums`, every element appears *twice* except for one. Find that single one. Could you implement a solution with a linear runtime complexity and without using extra memory?(Hint: xor)

Input: `nums = [2,2,1]`

Output: `1`

```
Input: nums = [4,1,2,1,2]
Output: 4
```

7. PrintNumberInWord (nested-if, switch-case):
Write a program called PrintNumberInWord which prints "ONE", "TWO",... , "NINE", "OTHER" if the int variable "number" is 1, 2,... , 9, or other, respectively.
Use (a) a "nested-if" statement; (b) a "switch-case" statement.

8. Create your own int wrapper class.
Hint: What are the fields, constructor and which method should your wrapper class include(intValue(), shortValue(), equals() etc.).