

## 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 an Immutable class in Java? How do you create an immutable class?
6. What is String pool in Java and why we need String pool?
7. What are the results of following expressions? Please include the calculation process.
  - o  $5 \& 6$
  - o  $5 | 6$
  - o  $5 \wedge 6$
8. Why we need to use break statement in Switch statement?
9. What are access modifiers and their scopes in Java?
10. What is static field, static method and static class?
11. Explain the main method in Java.

## Coding Questions

Write code in Java to solve following problems. Please write your own answers. and 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. Please include a screen shoots of your code/output with your short answer session and submit the code as well.

1. Develop a mathematical Calculator for integer (assume no parentheses)

```
input: [5, 7], ["Add"]
output: 12
explanation: 5+7 = 12

input:[1, 2, 3, 4], ["Sub", "Mul", "Div"]
output: 0
explanation: 1-2*3/4 = 1-6/4 = 1-1 = 0
```

2. Write a Java program to convert minutes into a number of years and days.

```
Input: 3456789
Output: "3456789 minutes is approximately 6 years and 210 days"
```

3. (Occurrence of max numbers) Write a program that reads integers, finds the largest of them, and counts its occurrences.

```
input: [3, 5, 2, 5, 5, 5]
```

```
output: "The largest number is 5, The occurrence count of the largest number is 4"
```

4. 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: [2, 2, 1]
```

```
output: 1
```

```
input: [4, 1, 2, 1, 2]
```

```
output: 4
```

5. `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.

6. Create your customized int wrapper class.

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