## Sample exam 2

The INFDEV team

## 1 Question 1

Given the following block of code, fill in the stack, heap, and PC with all the steps taken by the program at runtime.

- Points: 4 (50% of total).
- Grading: one point per correctly filled-in execution step.
- Associated learning objective: abstraction.

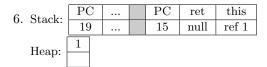
```
interface Animal {
       void makeSound();
   3
     class Dog : Animal {
       public Dog() {
       public void makeSound() {
         System.out.println("Woof!");
   8
  9
  10
  11
      class Cat : Animal {
       public Cat() {
  12
  13
  14
       public void makeSound() {
\sim 15
         System.out.println("Miao!");
  16
       }
  17
     Animal myAnimal = new Cat();
     myAnimal.makeSound();
```

1	Stack:	PC	
1.	Stack.	1	

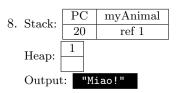
2	Stack:	PC	
۷.	Duack.	18	
	Hoon.	1	
	Heap:		

3.	Stack:	PC		PC	ret	this
		18		13	null	ref 1
	Heap:	1				

4.	Stack:	PC		PC	ret
		18		13	ref 1
	Heap:	1			







## 2 Question 2

Given the following block of code, fill in the declarations, class definitions, and PC with all steps taken by the compiler while type checking.

- Points: 4 (50% of total).
- $\bullet$  Grading: one point per correctly filled-in type checking step.
- $\bullet$  Associated learning objective:  $type\ checking.$

```
class Employee {
     private String name;
     public Employee() {
5
     public string GetName() {
6
       return this.name;
     }
8
   class Manager : Employee {
10
     public Manager() {
11
     public string GetFunction() {
12
13
       return "I am the boss!";
```

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```
14   }
15   }
16   ...
17   Employee employee = new Manager();
```

2. Declarations: PC 8

3. Declarations: PC 15

4. Declarations:  $\begin{array}{|c|c|c|}\hline PC \\ \hline 17 \\ \hline \end{array}$ 

5. Declarations: PC employee 18 Employee

 $\begin{array}{c} Employee & Manager \\ Employee=Employee \rightarrow Employee \\ GetName=Employee \rightarrow string \\ name=string \\ \end{array} \begin{array}{c} GetFunction=Manager \rightarrow string \\ GetName=Employee \rightarrow string \\ Manager=Manager \rightarrow Manager \\ name=string \\ \end{array}$