**Problem 1)**

Given the class `Student` and the following code, sketch the memory representation of the variables and the objects. After that, list down the following at each marked position in the code: objects (instances), instance attributes, object state, and the references.

```java
int a = 5;
Student s = new Student();
s.id = 1;
s.name = "Ahmad";
s.gpa = 4.50f;
// sketch the memory and list the required
s.id = 2;
s.name = "Khaled";
// sketch the memory and list the required
```

1. Memory Sketch is as follows: (the memory address is just randomly chosen)

   ![Memory Sketch 1](image)

   - Instance Attributes: `s`
   - Objects: the Student object referenced by the variable `s`
   - Object state: 1, "Ahmad", 4.50
   - References: 0x1A33

2. Memory Sketch is as follows: (the memory address is just randomly chosen)

   ![Memory Sketch 2](image)

   - Instance Attributes: `s`
   - Objects: the Student object referenced by the variable `s`
Problem 2)

Given the class SimpleNum and assuming that we ran this code:

```java
SimpleNum s1 = new SimpleNum();
SimpleNum s2 = new SimpleNum();
s1.x = 3;
s1.y = 10.0;
```

Now, answer the following:

1. Sketch the memory representation of s1 and s2 after running these two lines of code:

   ```java
   s2.x = s1.x;
s2.y = s1.y * 2.0 + 1.0;
   ```

   (The addresses are randomly chosen)
2. Sketch the memory representation of s1 and s2 after running these two lines of code:

\[
s2.x = 4; \\
s2 = s1; 
\]

(The addresses are randomly chosen)

3. Sketch the memory representation of s1, s2, and s3 after running these lines of code:

\[
s2 = s1; \\
s2.x = 5; \\
s2.y = 3.0 * s1.y; \\
SimpleNum s3 = s1; 
\]

(The addresses are randomly chosen)