

MIT-Africa Internet Technology Initiative (MIT-AITI)
Practice Problems: Topics 1-8

1. What does the following piece of code print out when executed as part of a program?

```
int numHours = 1;

while (++numHours < 5) {

    if (numHours == 4)
        numHours += 2;

    switch (numHours) {
        case 1:
            System.out.println("one hour");
        case 2:
            System.out.println("two hours");
        case 3:
            System.out.println("three hours");
        case 4:
            System.out.println("four hours");
            break;
        default:
            System.out.println("invalid number of hours");
    }
}
```

2. What does the following piece of code print out when executed as part of a program?

```
int f(int x) {
    return (x + 3)/6;
}

double g(int x) {
    return (x - 6) * 0.5;
}

String h(double x) {
    return String.valueOf(x + 0.5);
}

...

System.out.println(h(g(f(12))).length());
```

3. What happens when the following piece of code is executed as part of a program?

```
int[] a = new int[10];
int c = 1;
for (int i = 0; i < 1000 && c <= 10; i++, c++) {
    a[9 - i % c] = i * i;
}

for (int i = 0; i < a.length; i++)
    System.out.println(a[i]);
```

4. Create a well-designed (i.e. does not violate the abstraction barrier) class that represents an MIT student. The class must adhere to the following specification:

- The class must have a name, a student ID, and a GPA.
- You must be able to create a new student using a constructor that takes the student's name and ID (and gives the student a default GPA of 0) or using a constructor that takes name, ID, and GPA.
- You must provide ways to obtain the name, ID, and GPA of the student, and also a way to update the student's GPA.
- You must also write a method that determines the letter grade that corresponds to the student's GPA (5.0 is A, ≥ 4.0 is B, ≥ 3.0 is C, ≥ 2.0 is D, otherwise F). It should return a value of type char, and should be named "getLetterGrade".