

Introduction to Computer Science II
Fall 2016
MID-TERM EXAM

1. (15 points) Provide short answers (a few sentences) to each of the following questions:

- (a) What does it mean to designate a datum or method as **public** or **private**? Why should some such members be designated **private**?
- (b) Why must a recursive method contain a *base case*?
- (c) Why must a *constructor* have no return type?

2. (25 points) Consider writing a method that does the following:

- Prompt the user to enter an integer between the **min** and **max** values, inclusive.
- Obtain the user's input as a **String** by using the following (assumedly) already written method:
`public static String getTypedInput()`
- Attempt to convert the obtained input into an **int** by calling the following **Integer** class method:
`public static int parseInt (String s) throws NumberFormatException`
- If the user's input is not convertible to an integer, or if the value entered is outside of the range specified by **min** and **max**, prompt the user again until this condition is fulfilled.
- Return the converted **int**.

Complete this method:

```
public static int getIntInRange (int min, int max) {
```

3. (25 points) Consider the following two object classes ...

```
public class Alpha {

    protected int _x;

    public Alpha (int x) {
        _x = x;
    }

    public void show1 () {
        System.out.println("Alpha 1: " + _x);
    }

    public static void show2 () {
        System.out.println("Alpha 2");
    }

    public void show3 () {
        this.show2();
    }
}

public class Beta extends Alpha {
    private int _x;

    public Beta (int x) {
        super(x);
        _x = x * 2;
    }

    public void show1 () {
        System.out.println("Beta 1: " + _x + " " + super._x);
    }

    public static void show2 () {
        System.out.println("Beta 2");
    }

    public void show3 () {
        this.show2();
    }
}
```

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...as well as this static class ...

```
public class Go {  
    public static void main (String[] args) {  
        Alpha a = new Beta(4);  
        a.show1();  
        a.show2();  
        a.show3();  
    }  
}
```

Show the output generated when this program is run by invoking:¹

```
$ java Go
```

¹You may provide short explanations of why you chose that particular output.

4. (25 points) Consider the following recursive method:

```
public static void doit (int n, char prefix) {  
  
    if (n > 0) {  
  
        System.out.println("a: " + prefix + n);  
        doit(n-1, '$');  
        System.out.println("b: " + prefix + n);  
        doit(n-1, '%');  
        System.out.println("c: " + prefix + n);  
  
    }  
  
}
```

Show the output generated when this method is called like so:²

```
doit(3, '!');
```

5. (10 points) Free points suffering through this exam.

²Again, explanations, diagrams, or any other demonstration of your thinking is welcome.