CS1011: Introduction to Programming:
Practical 1: Teaching Week 3

Instructions:

The example files you need for this practical are available on DUO. BlueJ is available on the ITS machines in the laboratories.

Level 1: Interacting with BlueJ

a. Using the ***Picture*** example project in BlueJ, create an image of a house and a sun. While you are doing this, write down what you have to do to achieve this. Are there other ways this could be achieved?

(BlueJ ex. 1.9) **Hint**: Start by creating instances of the Circle, Square and Triangle by right clicking on each and selecting `new Circle()`. Do the same for Canvas to show the drawing area, then for each of the red boxes representing instances of the Circle, Square and Triangle object classes, right click on them and select `void makeVisible()`. You will notice other actions (**methods**) you can perform on the objects. Use these to move the objects around and change their colours. (You can create multiple **instances** of each shape.)

b. Using the ***Turtle*** project provided on DUO to draw your initials. While you are doing this, write down what you have to do to achieve this. Are there other ways this could be achieved?

Hint: Start by creating an **instance** of Turtle and TurtleWorld (`new Turtle()` and `new TurtleWorld()`). Use the `void display()` **method** in the instance of TurtleWorld to show the drawing area, then use `void dropIn(Turtle t)` to add the instance of the turtle you created to the TurtleWorld. Type in the name you gave to the Turtle created when 'dropping' it into the world.

c. Using the ***LabClass*** example project in BlueJ, create an **instance** of a lab class, entering a low number for the maximum students. Then create multiple instances of the student class. Remember, when creating the instances of the students, the name and ID are of the String data type so need to be enclosed in double quotes, e.g. "Patricia". Use the **methods** in the instance of the LabClass you created to enrol the students created, filling in the other details for the lab class, then print out the lab class details. Look at what happens when you try to enrol more students than there is capacity for.
(BlueJ ex. 1.17-1.21)

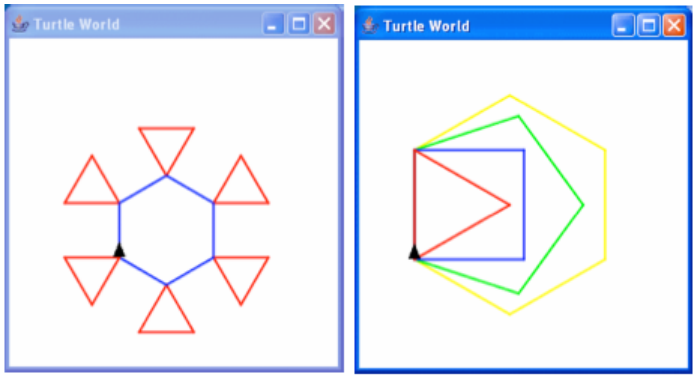
Level 2: Starting to Program

a. Using the ***Picture*** example project in BlueJ again, create an instance of the Picture class and draw it to look at the picture produced. Now open the object to look at the code. The main 'instructions' for producing the picture are given in the method starting `public void draw()`. The sun, roof, window and wall are created at the top of the file. Extend this file changing some of the colours and adding in ground with a tree.

For a further challenge, try adding in a sunset as a separate method, (BlueJ ex.1.14).

b. Using the ***Turtle*** project again, create an instance of the Picture Maker class. Use the `void display()` and `void drawInitials()` methods to show and draw two letters. Open the source code editor for the PictureMaker class to look at the instructions used to draw the initials. Modify these instructions to draw your own initials.

For a further challenge try drawing some of the patterns in the pictures below:



c. Below is a method that can be added into the LabClass Class to automate the setting up of a specific class with predefined students. Add this into your LabClass and modify it to match the students that you added before. Try adding something to change the capacity for the lab.

```
public void autoLab() {
    setInstructor("Simon Smith");
    setRoom("AB123");
    setTime("Monday, 11am");
    Student s1 = new Student("Jo Bloggs", "S01234");
    Student s2 = new Student("John Smith", "S01235");
    enrollStudent(s1);
    enrollStudent(s2);
    printList();
}
```

Level 3: Modelling Objects

We are starting to look at how to model objects, so here we would like you to have a go at thinking about how to model some objects. Remember that objects contain properties (**fields**), a way of constructing a new instance of this object (usually how to set values to the properties defined) and actions (**methods**) that the object can perform.
Thinking about the various components of an object, we would like to you model a pet using pen and paper, or in a simple text document, or using Violet if you have it. When considering the different properties associated with the object, think about what a suitable data type might be, for example int, boolean, double, String, ...

Whilst considering the actions (methods), try to think about the instructions that you would need to give in order to achieve the action and how it may effect some of the properties of the pet, writing it out in words.
Some examples of different pets and associated actions and properties are given below: Dog - Bark, walk, eat, sleep, play (name, age, alive, health) Fish - bob, swim, eat Snake - Hiss, eat, shed skin