Game and Animation Loop

Firstly setup a JFrame and JPanel **as in previous tutorial**

Import these libraries:

In [ ]:

```
import java.awt.*;
import javax.swing.*;
```

Then add the following to your main method:

In [ ]:

```
JFrame frame = new JFrame("My Frame");
frame.setPreferredSize(new Dimension(500, 500));
frame.setResizable(false);
frame.pack();
frame.setVisible(true);

JPanel panel = new JPanel();
panel.setPreferredSize(new Dimension(500, 500));

frame.add(panel);
frame.pack();

frame.setIgnoreRepaint(true);
panel.setIgnoreRepaint(true);
```

Currently our JFrame's content is static.

For a game or animation, we need a way for the program to **repeatedly** update its state and then draw (or render) the new state to the screen (graphics object of frame/panel). We thus idealy want an `update()` function and a `draw(Graphics2D g2)` function.

Create a loop that wil repeatedly run and then sleep for 50ms.

In [ ]:

```
while (true) {

    // code goes here

    Thread.sleep(50);
}
```

Now add a functions for updating and drawing. For the moment we will be accessing these methods from a static main method, therefore these functions need to be static as well. Implement them in the game loop.

In [ ]:

```
static void update() {

    // updates to game state goes here

}
```

In [ ]:

```
static void draw(Graphics2D g2) {

    // drawing code goes here

}
```

In [ ]:

```
while (true) {

    // update game parameters
    update();

    // draw current state to graphics object
    Graphics2D g2 = (Graphics2D) panel.getGraphics();
    draw(g2);
    g2.dispose();

    Thread.sleep(50);
}
```

Now lets animate something. e.g. A circle moving from top-left to bottom-right of screen.

Note the coordinate system used by java.awt and javax.swing libraries

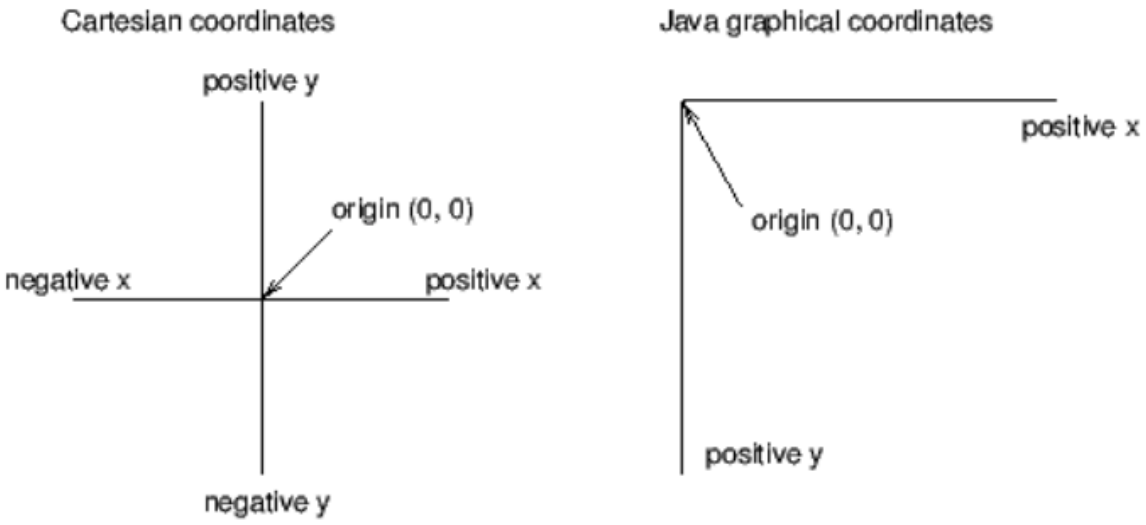


Image source: http://www.greenteapress.com/thinkapjava/html/thinkjava019.html (http://www.greenteapress.com/thinkapjava/html/thinkjava019.html)

Define initial position x, y of circle as static global variables in Tut2 class

In [ ]:

```
static int x = 0;
static int y = 0;
```

Increment the x and y coordinates in the `update()` method to update the circle's position each frame

In [ ]:

```
static void update() {

    x += 5;
    y += 5;
}
```

Draw the circle based on the current (yet updated) state using `draw(Graphics2D g2)` method

In [ ]:

```
static void draw(Graphics2D g2) {

    g2.drawOval(x,y,20,20);
}
```

Try and compile and the program.

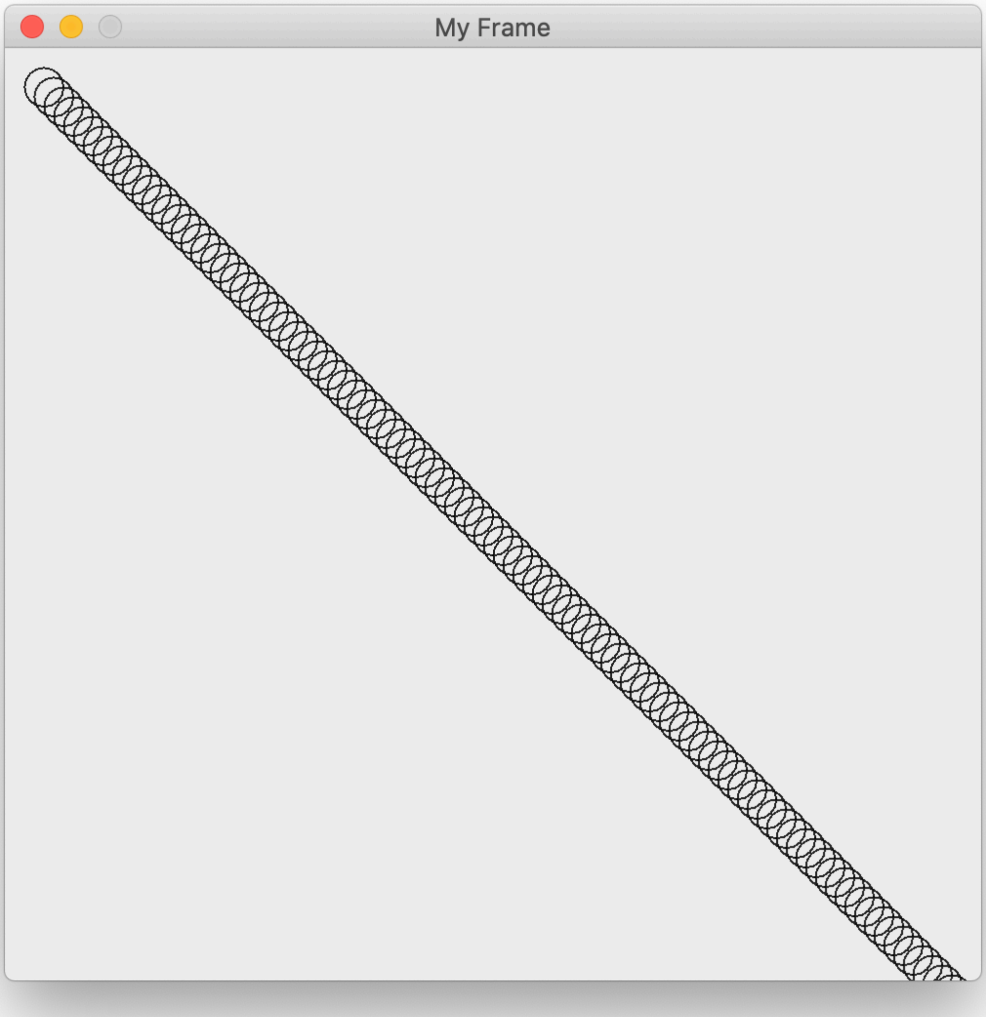
You will probably have an issue with the Thread.sleep(50) not being wrapped in a try ... catch

```
error: unreported exception InterruptedException; must be c
aught or declared to be thrown
    Thread.sleep(50);
```

For now just add `throws Exception` to your main method definition to take care of the error.

```
public static void main(String[] args) throws Exception {
    ...
```

Run again and you should see this:



Add a solid rectangle to act as background and to 'clear' any drawing of previous frame before drawing next. Make it the same size as the frame.

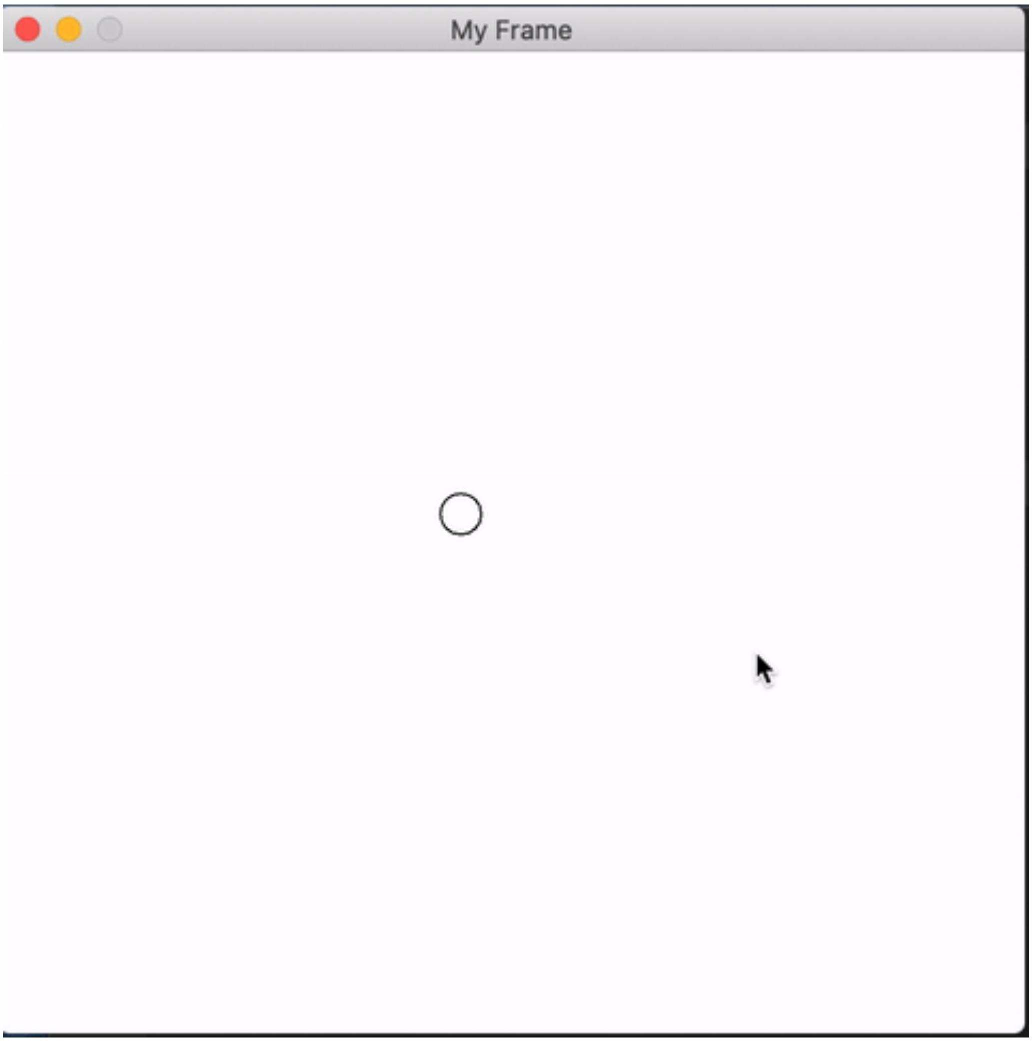
In [ ]:
```
static void draw(Graphics2D g2) {

    g2.setColor(Color.WHITE);
    g2.fillRect(0, 0, 500, 500);

    g2.setColor(Color.BLACK);
    g2.drawOval(x, y, 20, 20);

}
```

Run again, and you will see more desirable results.



This loop with update() and draw(Graphics2D g2) method forms the basis to our game and is **critical to understand**. Almost all other classes (e.g. Shooter, Missile, Bunker) will have their own version of a update and draw function that will be somehow called from this game loop.

Code

```
import java.awt.*;
import java.awt.image.*;
import javax.swing.*;

public class Tut2 {

    static int x = 0;
    static int y = 0;

    public static void main(String[] args) throws Exception
{

        JFrame frame = new JFrame("My Frame");
        frame.setPreferredSize(new Dimension(500, 500));
        frame.setResizable(false);
```

```
            frame.pack();
            frame.setVisible(true);

            JPanel panel = new JPanel();
            panel.setPreferredSize(new Dimension(500, 500));

            frame.add(panel);
            frame.pack();

            frame.setIgnoreRepaint(true);
            panel.setIgnoreRepaint(true);

            while (true) {

                // update game parameters
                update();

                // draw current state to graphics object
                Graphics2D g2 = (Graphics2D) frame.getGraphics(
    );

                draw(g2);
                g2.dispose();

                Thread.sleep(50);
            }

        }

        static void update() {
            x += 5;
            y += 5;
        }

        static void draw(Graphics2D g2) {

            g2.setColor(Color.WHITE);
            g2.fillRect(0, 0, 500, 500);

        g2.setColor(Color.BLACK);
        g2.drawOval(x, y, 20, 20);

    }

}
```

In [ ]: