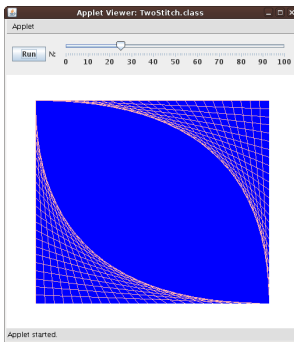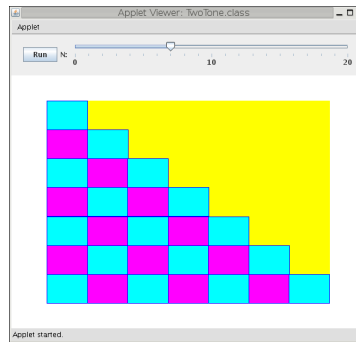# MAT 2170: Laboratory 5

Key Concepts

1. `for` & `while` loops
2. `if` statements
3. graphics, coordinate translation

The main purpose of this lab is to give you more practice using loops, and to introduce you to using `if` statements. As usual, create these projects in a `mat2170/lab5` directory.
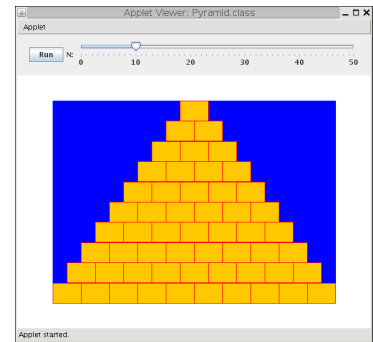
Exercises

Exercise 1. Double Curve Stitch   Exercise 2. Two–Tone Triangle   Exercise 3. Pyramid

1. (Curve Stitch, Revisited) In this new version, display a rectangle in the graphics window which is 80% of the width and height of the window and centered in it, then add the curve stitch to the bottom left and upper right corners. Do not use magic numbers for the dimensions of the rectangle — calculate them using 80% of `getWidth()` and `getHeight()`. A blue background with pink stitches is quite lovely, but you may choose your own colors as long as everything shows up and isn't just black and white. Your solution is to be a slider program with a slider range of 3 to 100.

2. (Lower–left Triangle, Revisited) As with the Curve Stitch exercise above, display the triangle in a centered rectangle that is 80% of the width and height of the graphics window. Your solution is to be a slider program with a slider range of 1 to 30, and graphics window size of 600 (width) by 500 (height). Your final version is to output a triangle with the number of rows and columns determined by the slider. The blocks should alternate colors: a yellow background with cyan or magenta blocks with blue outlines may be just the thing. Use an `if` statement to set the colors. When you publish this project, choose a window size which is *not* square, and make sure the slider and Run button are completely accessible.

3. (Pyramid) This exercise is a slightly modified version of one from your textbook. A stack of blocks should fit "exactly" into a centered rectangle that is 80% of the graphics window's width and height. Use a slider program with a slider range of 1 to 50, where the slider indicates the number of rows to be placed in the rectangle. Set the graphics window size to 600 × 500. Thus, in this exercise (unlike the book's), the width and height of each brick is directly related to the size of the window. You may start at either the top or bottom of the pyramid – it can be built in either direction. Make the background rectangle blue and the bricks orange with red outlines. When you publish to your website, choose a window size which is *not* square, and make sure the slider and Run button are completely accessible.

4. (Nested Ovals, Group Project) A set of concentric ovals should fit "exactly" within a centered rectangle in a graphics window. Use a slider program with a slider range of 30 to 100, indicating what percent of the window's width and height the background rectangle should be. For example, if the slider is set to 80, the width of the background rectangle should be 80% of the window's width, and the height should be 80% of the window's height. The nested ovals should then fit within the background rectangle, with the largest being the same size (and at the same location) as the background rectangle.
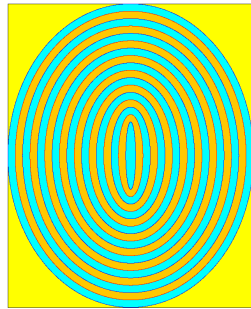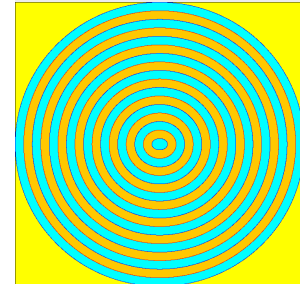

Ex 4. Nested Ovals at 85%
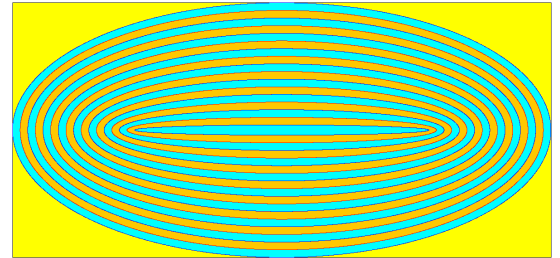
Ex 4. Nested Ovals at 80%
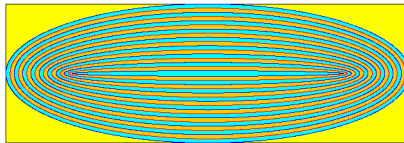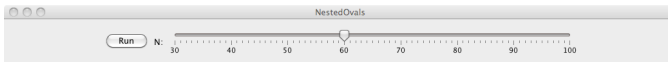
Ex 4. Nested Ovals at 60%

Ex 4. Nested Ovals at 100%

Each oval should be smaller by a *step* that is 6% of the **smaller of the width or height** of the background rectangle. The colors of the ovals are to alternate: a yellow background with cyan (with blue border) and orange (with red border) ovals. The drawing of ovals is to stop when either the width or the height of the oval to be displayed is zero or less. Use an `if` statement to set the value of `step` and another to select the current oval's colors inside the loop. Once the group has successfully completed the project, each person in the group should add a copy of it to their lab5 projects, and hand a printout in with their other programs.

Finishing Up

When you have completed the lab,

1. Publish each program to your web site before Lab 6.

2. Hand in printouts of all programs, stapled together, at the beginning of Lab 6

3. Submit an electronic copy of lab5 before Lab 6

4. Make sure I check your Worksheet 5 before you leave lab, and complete Worksheet 6 by the beginning of Lab 6.