

MAT 2170: Laboratory 2

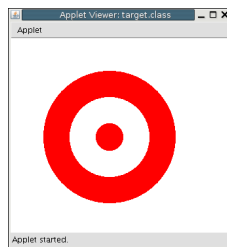
Key Concepts

The purpose of this lab is to familiarize you with sending messages to objects (invoking methods), and to give you a chance to become acquainted with the graphics capabilities of the `acmLibrary` and `GraphicsProgram`.

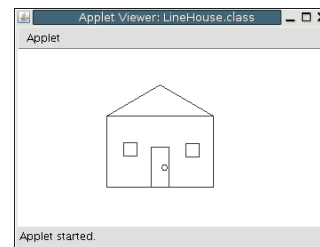
1. The classes: `GRect`, `G Oval`, and `GLine`
2. The methods: `setColor()`, `setFilled()`, and `setFillColor()`
3. Using constructors to make new objects
4. Using the `add` method to display graphics objects
5. Using meaningful object names
6. Using line comments to keep track of what is being drawn

Exercises

1. Complete the Prelab and be prepared to show it to your instructor when requested during of lab.
2. Login using your EIU userid and password. Start `netbeans`.
3. You are to create this week's projects in the directory `mat2170/lab2` under your user account (not in any other directory). This can be done at the time each project is created in `netbeans`.
4. (Exer. 6, Pg 55) Create a graphics project, `Target` which displays a bullseye. It should look something like the image on the left below. The two tinted rings should be red, while the middle one is white. The inner circle has a diameter of 40 pixels in this example. Make sure your target is **symmetric** (the circles all have the same center), and that you place **block comments** in the body of your program to indicate which part of the target is being drawn. As always, include **header comments** with your name, section, date, filename, and brief description of what the program does. Print the final version of your program to hand in before you leave lab.



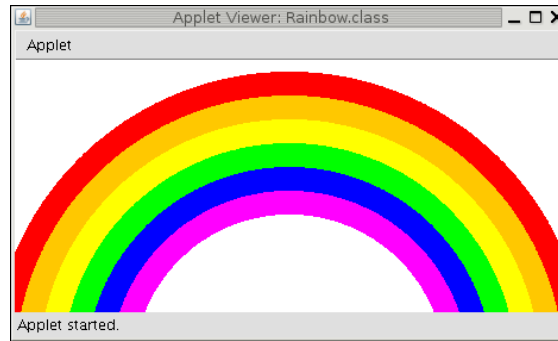
Target



Line House

5. (Exer. 4, Pg 54) Create a graphics project, `LineHouse` which displays a line drawing of a house. It should look something like the image on the right above. In this example, the house is 120 by 80 pixels. Use only the `GLine` class to construct this house — not the `GRect` class. Make sure the house has a roof, door, doorknob (yes, you can use `G Oval`), and two windows. It should be symmetric. Place block comments in your program to indicate which part of the house is being drawn, and include the usual header comments. If you wish, you are encouraged to do some remodeling of your house – add a chimney, a front walk, a tree, clouds – whatever you think might improve its value. Print out the final version of your program to hand in before you leave lab.

6. (Exer. 9, Pg 56) Create a graphics project, **Rainbow** which displays a rainbow. It should look something like the following:



- The colors run from red to orange, yellow, green, blue, and magenta. Make sure your rainbow is symmetric (all circles have the same center point). Place block comments in your program to indicate which arc of the rainbow is being drawn, and include the usual header comments. Print out the final version of your program to hand in before you leave lab.
7. Publish all three of these programs to your web page, listed under **Lab 2**, as **Target**, **LineHouse**, and **Rainbow**. You will need to update the `index.html` file, create new `html` files for each of these projects, and copy their `jar` files to your `www` directory. Test that your links work before uploading these changes to your personal web site (use an `iTerm` and enter `websync`).
 8. Staple program printouts from Lab 2 together and hand in before the end of lab today.
 9. Complete the Postlab exercises.
 10. After you have completed the Postlab, submit an electronic copy of your work. In a Finder window, locate your lab2 folder, then drag and drop it in the EIU submissions application on your dock. When asked, choose 2170.
 11. Staple the program printouts from the Postlab to the Postlab sheet and hand these in at the beginning of Lab 3.

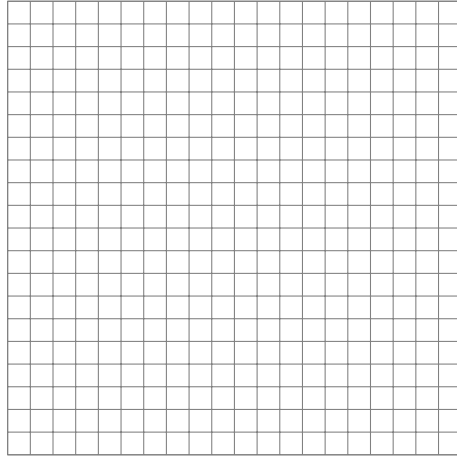
Lab 2— Prelab

Name: _____

Recall: the origin is in the upper left corner, and Y values increase as you move down the window. Sketch the target, line house, and rainbow in each of the provided grids, flush to the top left corner. In the second grid (for the target and house), move the figure away from the top left corner. Then, for each exercise, construct a table of values which shows the placement and size of each object used to create the final picture. Use each square as a single unit, then multiply by 20 for the number of pixels.

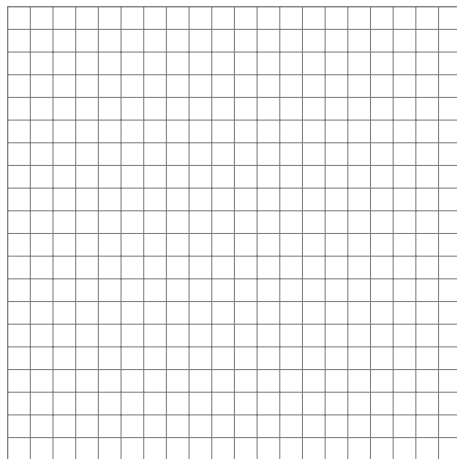
1. Exercise 1: Target

(a) Target — flush to top left corner



	x	y	w	h
Outer circle				
Middle circle				
Center circle				

(b) Target — moved right 3 units and down 3 units



$\Delta x =$

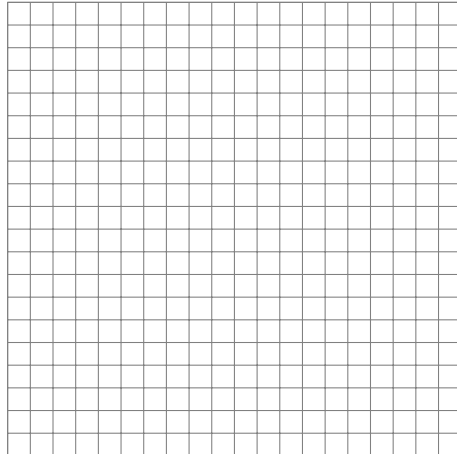
$\Delta y =$

translated	x	y	w	h
Outer circle				
Middle circle				
Center circle				

scaled by 20	x	y	w	h	filled?	color name
Outer GOval						
Middle GOval						
Center GOval						

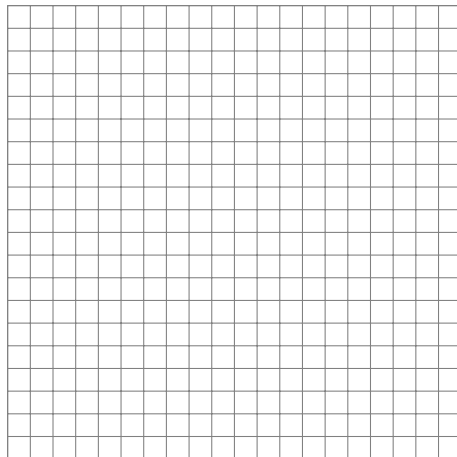
2. Exercise 2: Line House (incomplete — not all lines given in tables below)

(a) Line house - flush to top left corner



	x	y
Left wall: Upper		
Left wall: Lower		
Roof peak		
Right wall: Upper		
Right wall: Lower		

(b) Line House - moved right 5 units and down 3 units



$\Delta x =$

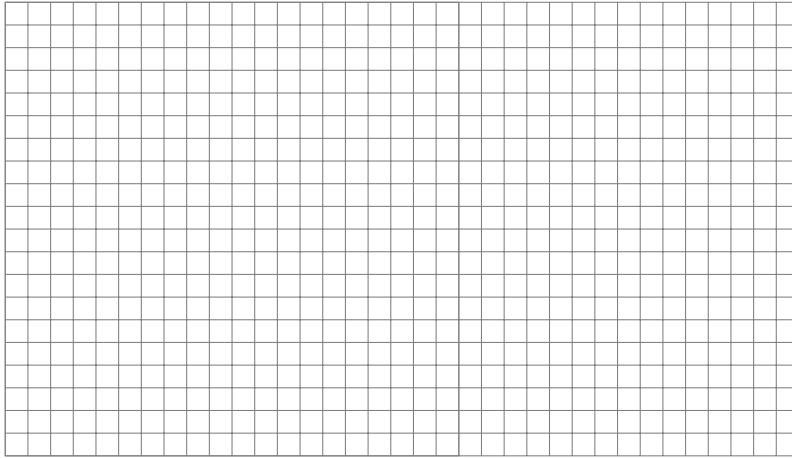
$\Delta y =$

	x	y
Left wall: Upper		
Left wall: Lower		
Roof peak		
Right wall: Upper		
Right wall: Lower		

Scaled by 20	x_1	y_1	x_2	y_2
Left Wall GLine				
Right Wall GLine				
Roofline GLine				
Baseline GLine				
Door Upper				
Door Left				
Door Right				
Left window: Left side				
Left window: Right side				
Left window: Upper				
Left window: Lower				

3. Exercise 3: Rainbow (7 circles, lower half –below window– covered by rectangle)

(a) Rainbow - flush to top left corner

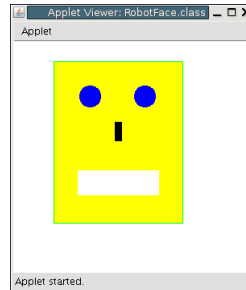


	x	y	w	h
Red circle				
Orange circle				
Yellow circle				
Green circle				
Blue circle				
Magenta circle				
White circle				
White rectangle				

Down 5, scale by 20	x	y	w	h	filled?	color name
Red GOval						
Orange GOval						
Yellow GOval						
Green GOval						
Blue GOval						
Magenta GOval						
White GOval						
White GRect						

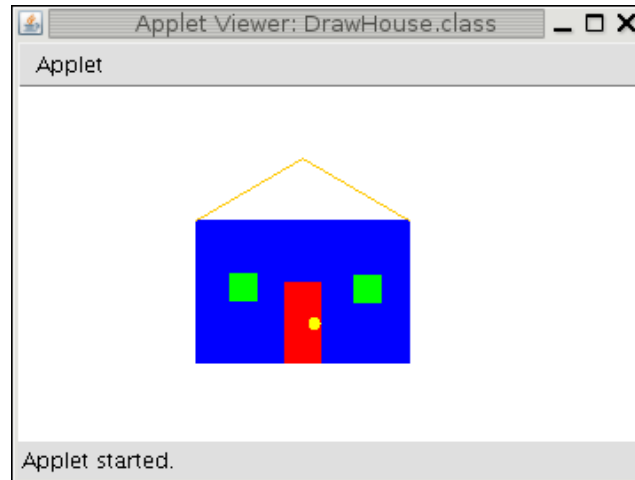
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1. (Exer. 5, Pg 54) Create a graphics program, `RobotFace` which displays a sort of face. It should look something like the image below — the face is yellow with cyan outline, blue eyes, black nose, and white mouth. Make sure your face is symmetric, and that you place block comments in the body of your program to indicate which part of the face is being drawn. As always, include header comments with your name, section, date, Postlab 2, filename, and brief description of what the program does.



- (a) How does the location of the top, left corner of the `GRect` composing the face in the `Postlab` impact the other coordinates? (I.e., how is it different from when it is flush with the origin?)
- (b) In Java, how do you specify the object to which a message is directed?
- (c) What is the difference between a syntax error and a bug (semantic error)?
- (d) Why is it important to apply good software engineering principles when you write your programs?

2. (Exer. 4, Pg 54 — Modification) Create a graphics program, `DrawHouse`, which displays a drawing of a house using rectangles instead of all lines. It should look something like the image below. Make use of the `GRect` class to draw the basic house, windows and door. Unless you find a better way, the roof is composed of two `GLine` objects. Your house should be symmetric. Place block comments in your program to indicate which part of the house is being drawn, and include the usual header comments, including the fact that this is Postlab 2.



3. What to turn in:
- Be sure your name is on the postlab worksheet, staple the program printouts to it, and turn it in at the beginning of Lab 3.
 - Publish these applets on your web page by updating the `index.html` file, creating new `html` files, checking the links work, then typing `websync` in an `iTerm` window, followed by entering your password (which will not show up).
 - When you have completely finished all the programs for lab 2, submit your work electronically by dragging the `lab2` folder to the EIU submit app on your dock.