

**ISE 108 Midterm 1 Instructions**

1. Please sit at the machine to which you have been assigned. You can find the machine number on a label on the lid of each computer.
2. The score for a perfect final exam, not counting extra credit, is 100 points.
3. Partial credit may be assigned at the instructor's discretion.
4. The exam is open-book, open-notes, limited Internet. You will only have access to one Web site during the exam, the course Web page, which can be found at:  
  
<http://www.cs.stonybrook.edu/~tashbook/fall2016/ise108>
5. **You may not use cell phones, tablets, e-readers, pagers, or any other electronic devices during the exam, except for USB flash drives and the computers that are installed in the exam room.** Please turn all prohibited devices off for the duration of the exam.
6. You **may not** communicate in any fashion (notes, etc.) with any other students during the exam. **Any suspected cheating will result in a grade of 0 for the exam and academic dishonesty charges.**
7. At the start of the exam, your instructor will tell you where to find the questions and the starting code for the exam problems. You will also be provided with instructions for submitting your completed work.

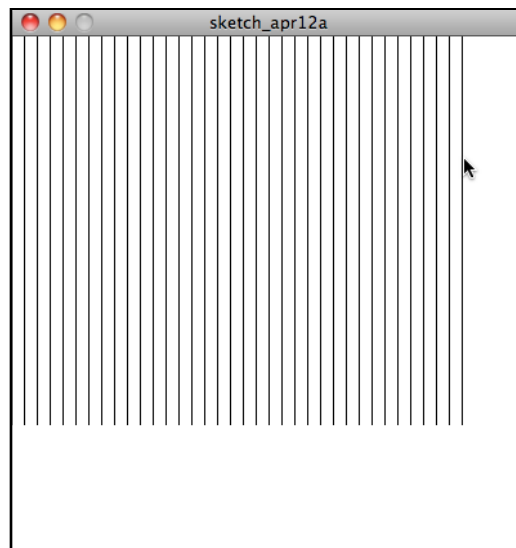
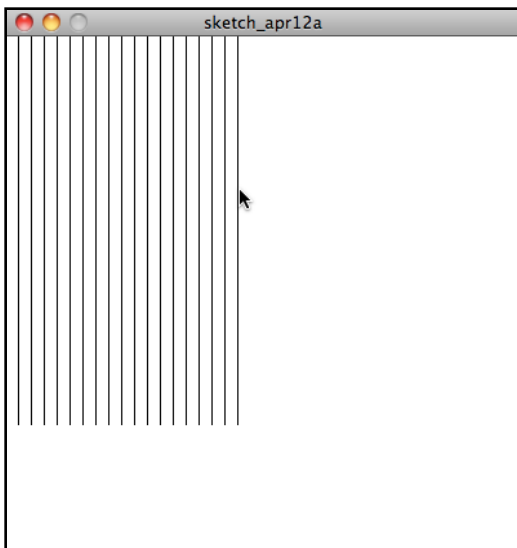
## 1. Drawing Letters (25 points)

The Processing sketch “letters” displays two vertical parallel lines. Modify this program so that, when the user presses the ‘n’ or ‘h’ key, a third line appears to form that letter shape (the line can stay until a different key is pressed):



## 2. Loops and Lines (25 points)

The Processing sketch “problem\_two” is designed to draw a set of evenly-spaced vertical lines from the left side of the window up until the mouse pointer’s current x position. As the mouse pointer moves left and right, the set of lines will grow and shrink in length, as illustrated below. Complete the draw() function so that the program works correctly (HINT: Use a loop!).



### 3. Classes (25 points)

The "QuadraticEquation" program contains a partial class definition for a class named `Quadratic` that represents a quadratic equation  $ax^2 + bx + c = 0$ .

- Complete the constructor, which assigns its arguments, in order, to `a`, `b`, and `c`.
- Complete the `discriminant()` method, which returns the discriminant for this equation. The discriminant is calculated as  $b^2 - 4ac$ .
- Complete the `root()` method as follows: If the discriminant is negative, return 0. Otherwise, the root is computed as:

$$(-b + \sqrt{b^2 - 4ac}) / 2a$$

**Hint:** Use Processing's built-in `sqrt()` function to calculate square roots! For example, `sqrt(25)` will return 5.0 (the function always returns a `float`).

### 4. Conditional Color (25 Points)

The Processing sketch "conditional\_color" displays a shape that follows the mouse pointer and alternates between a rectangle and an ellipse based on the mouse's horizontal position. Modify your program so that the fill color changes based on how far up or down the mouse pointer is inside the window (for example, if the mouse pointer is near the top of the window, draw the ellipse/rectangle in one color; if it's at the bottom of the window, draw the shape in a different color). Use at least four different colors, as shown in the table to the right. You can add your code in either `draw()` or `drawShape()`.

top 100 pixels - color 1
second 100 pixels - color 2
third 100 pixels - color 3
bottom 100 pixels - color 4

### 5. Extra Credit (10 points)

Complete the "Android" program, which reproduces the image shown to the right. **HINT:** To get the rounded head, draw an ellipse and then cover its lower half with an overlapping rectangle.

