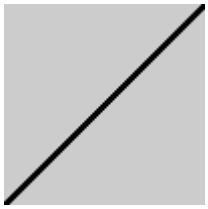
CS 145 Images and Imagination

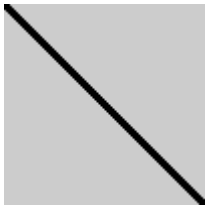
Practice Problems for Exam 1

1. For each of the following images, fill in the parameters for the `line` command so that it generates the image shown on left.

```
size(100,100);
strokeWeight(3);
line(   …      );   // what should this be for each of the images below
```

a) `line(                    );`

b)  `line(                    );`

c)  `line(                    );`

2. What is value of x and y after executing the following code?

   a.
```
int x = 4;
int y = 6;
x = y;
```

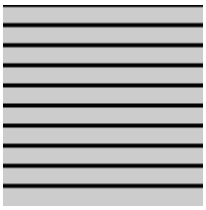
   x is _____, y is _____

   b.
```
int x = 2;
int y = 3;
int z = 4;
z = x;
x = y;
y = z;
```

   x is _____, y is _____, z is _____

3. In the code below, complete the loop code needed to generate the given images (use the Processing variables `width` and `height` where possible):

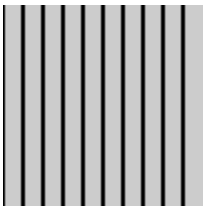
a.



```
size(100,100);
strokeWeight(2);
for (         ;             ;         ) {

  line(                        );
}
```

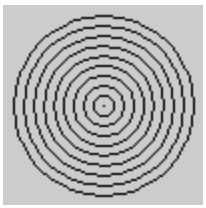
b.



```
size(100,100);
strokeWeight(2);
for (          ;           ;             ){

   line(                        );
}
```

c.

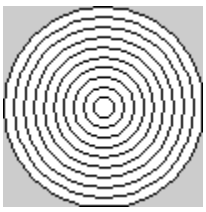


```
size(100,100);
ellipseMode(CENTER);
noFill();

for (          ;        ;         ) {
   ellipse(                          );

}
```

d.

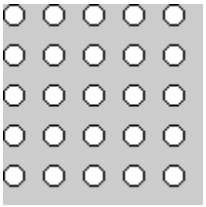


```
size(100,100);
ellipseMode(CENTER);
fill(255);

for (          ;        ;         ) {
      ellipse(                          );

 }
```

e.



```
size(100,100);
strokeWeight(1);
ellipseMode(CORNER);
for (int i = 0;            ;            ) {
   for (int j=0;           ;            ) {
   ellipse(                );
 }
}
```

4. Assume that you have integer variables x and y declared:
   int x;
   int y;
   How do you write a Boolean expression that *evaluates to* `true` if
   a. x is larger than 100. _____
   b. x is not equal to y. _____
   c. x is smaller than twice y. _____
   d. x is between 10 and 20. _____
   e. x is either equal to 10 or it is equal to 50. _____.

5. The following code draws a square at the point (x,y). Assume that x and y are integers that are declared and set elsewhere in the code.

```
rect(x,y,20,20);
```

   a. Add a conditional statement (i.e. an "if-else statement") so that the fill color of the square will be red if y is smaller than 100, and blue otherwise.

   b. Modify your conditional statement so that the color of the square will be red if y is smaller than 100, blue if y is between 100 and 200, and green if y is larger than 200.

6. Given the code:

```
Line 1    int s = 300;

Line 2    void setup() {
Line 3       size(s,s);
Line 4       background(100);
Line 5       drawShape(100,50);
Line 6       translate(t,0);
Line 7       drawShape(150,100);
Line 8    }

Line 9    int t = 25;

Line 10   drawShape(int x, int y) {
Line 11     int w = 20;
Line 12     ellipse(x,y,w,w);
Line 13   }
```

   a. The first command executed is at Line 3. What is the next line executed, and the line after that, etc? That is, give the entire *sequence* of line numbers executed starting at Line 3 and ending when the program completes.

   b. Lines 1, 9, 10, and 11 contain variable declarations. What is the scope of each of these variables?

c. Suppose the following lines (bolded) were inserted into the above code as shown below. Which lines would generate an error?

d. Which of the added lines would not generate an error but would have no effect on the resulting image and so should be removed (or moved).

```
Line 1     int s = 300;
Line 1a    s = 400;

Line 2     void setup() {
Line 2a       s = 500;
Line 2b       x = 100;
Line 3        size(s,s);
Line 4        background(100);
Line 5        drawShape(100,50);
Line 6        translate(t,0);
Line 6a       t = 35;
Line 7        drawShape(150,100);
Line 7a       w = 30;
Line 8     }

Line 9     int t = 25;

Line 10    drawShape(int x, int y) {
Line 11      int w = 20;
Line 11a     x = 110;
Line 12      ellipse(x,y,w,w);
Line 13    }
```

7. Given the code:

```
Line 1    int s = 300;

Line 2    void setup() {
Line 3       size(s,s);
Line 4       translate(s/2, s/2);
Line 5       pushMatrix();
Line 6       rotate(radians(20));
Line 7       drawShape(100,50);
Line 8       popMatrix();
Line 9       translate(100,0);
Line 10      drawShape();
Line 11   }

Line 12   drawShape() {
Line 13     ellipse(0,0,20,20);
Line 14   }
```

What does the matrix stack look like immediately after executing:

a) Line 4

b) Line 7

c) Line 8

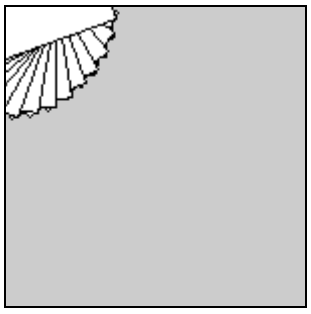
d) Line 10

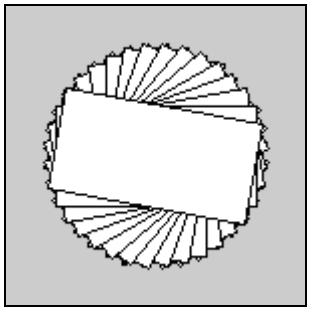
8. Given the code:

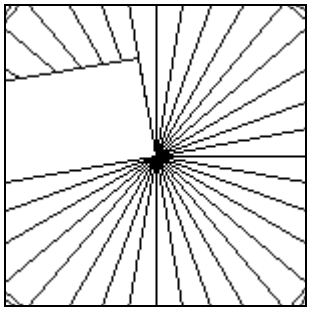
```
void setup() {
    size(150,150);
    rectMode(CENTER);
}
int angle = 0;
void draw() {
    // transformations go here

    rect(0,0,100,50);
    angle += 10;
}
```

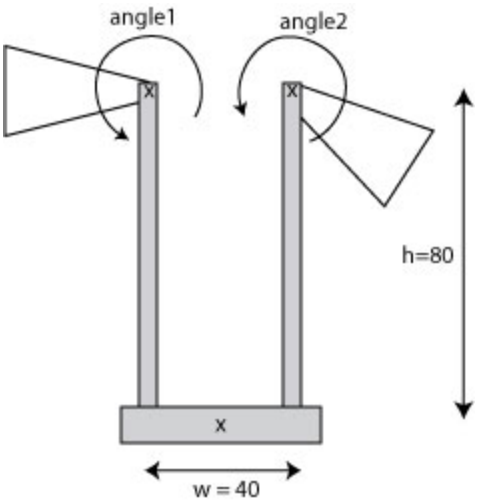
What transformation or sequence of transformations are needed before the `rect` command in order to make the rectangle rotate as shown in each of the images below:

a) 

b) 

c) 

9. Suppose you want to draw a "double" lamp in Processing where each lamp rotates as shown by an amount angle1 and angle2. The lamp as a whole can also be moved.



a. Following the style shown in lab 5 and in class, draw a graph of the structures. You can treat the lamp base (all the gray parts) as one piece. Include in your graph, the needed transformations.

b. Assume that you have a function lampBase which draws the lamp base with the origin at the indicated "x" at bottom. Assume you have a second function that draws the lamp shade with the origin at the "x" marked on the shade. What is the code that is needed in the `draw` method in order to draw and animate the entire lamp placed at the location where the mouse pointer is located.

```
void setup() {
  size(400,400);
  rectMode(CENTER);
}

float angle1 = 0;
float angle2 = 180;

void draw() {
  background(150);
  // fill in code here:
```

```
  angle1+=10;   // update angle1
  angle2-=10;   // update angle2
}

void lampBase() {
  …  // assume this is given
}

void shade() {
  …   // assume this is give
}
```