COMP 1010- Summer 2015 (A01)

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Hello!

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Fifa game nights

http://umanitoba.ca/campus/parking/igf.html

Assignment submission

Assignment 2 is out

the Java for loop syntax!

```
for (initialization; condition; upkeep)
{
        body;
}
```

1,2,3,4,

2,3,4

```
for (int i = 0; i < 10; i++)
{
        line(0, cellSizeY*i, width-1, cellSizeY*i);
}
```

1   **2**   **4**

3

2,3,4

How many times does the following loop run?

```
for (int x = 1; x <= 10; x++)
{
  println(x);
}
```

10 times!!

comparison

```
for (int x = 1; x <= 10; x++)
{
  println(x);
}
How about…

for (float x = 0.1; x <= 1.0; x += 0.1)
{
  println(x);
}
```

Floating point is not exact!!!!

Due to the way computers store floating point numbers, we get strange rounding and precision errors

Floats cannot be trusted for exact numbers!

- don't use them in for loops, use ints instead

- don't use them for serous money. Use specialized types (advanced)

- cannot trust exact comparisons...

Floats: cannot trust equals comparisons

```
if (0.7 == 0.7)
{
  println(1);
}



if (0.7 == 0.6+0.1)
{
  println(1);
}
```

Floats: cannot trust equals comparisons

What to do!?!?!?

Use <, <=, >, >= whenever possible

If you need to test if they're EQUAL, check if they are CLOSE enough....

Advanced:

      float threshold = 0.001;

      if (abs(f1-f2) < threshold)...

Don't use floats in for loops

Convert the loop to integers, and convert to floats

Instead of..

```
for (float t = 0; t<=1; t+= 0.1) // ten times..
```

```
float steps = 10;
for (int i = 0; i <= steps; i++)
{
        float t = i/steps; // careful of int division
}
```

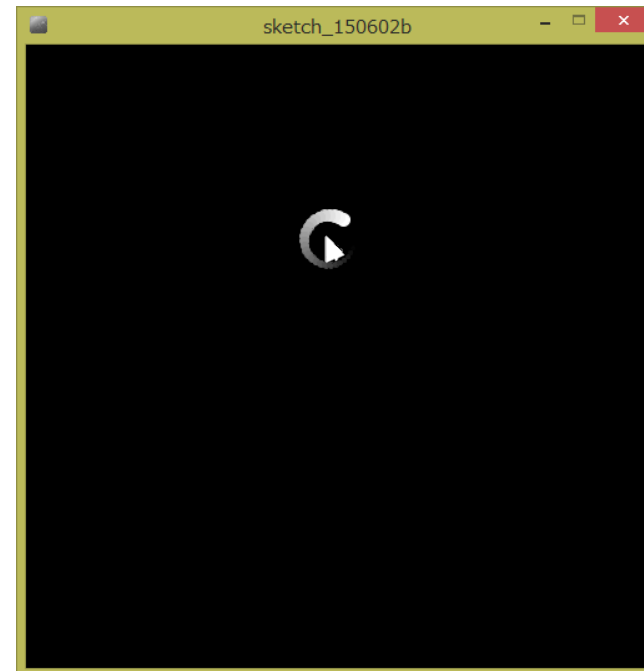How many times does this loop run?

Circle trail around mouse

First draw one circle and make it rotate (old)

Then, draw X circles behind that one!

      for loop: on # of circles (int), not on angle

Make the circle fade out

Make the circle shrink

```
int canvasSize = 500;
float bgColor = 0;
float drawColor = 255;

// circle details
float radius = 20;
float ballSize = 10;
float rotateSpeed = 0.1; // radians
float theta = 0;

// tail details
float ballCount = 20;
float ballSpacing = .1; // in radians
float ballDimming = 10;
float ballGravity = 1; // falls toward the mouse
float ballDecrease = .5;

void setup()
{
  size(canvasSize, canvasSize);
}

void draw()
{
  background(bgColor);

  float col = drawColor;
  float ballRadius = radius;
  float size = ballSize;

  for (int i = 0; i<ballCount; i++)
  {
    float angle = theta - i*ballSpacing;
    float x = ballRadius*cos(angle)+mouseX;
    float y = ballRadius*sin(angle)+mouseY;
    stroke(col);
    fill(col);
    ellipse(x, y, size, size);
    col -= ballDimming;
//    ballRadius -= ballGravity;
    size -= ballDecrease;
  }
  theta += rotateSpeed;
}
```
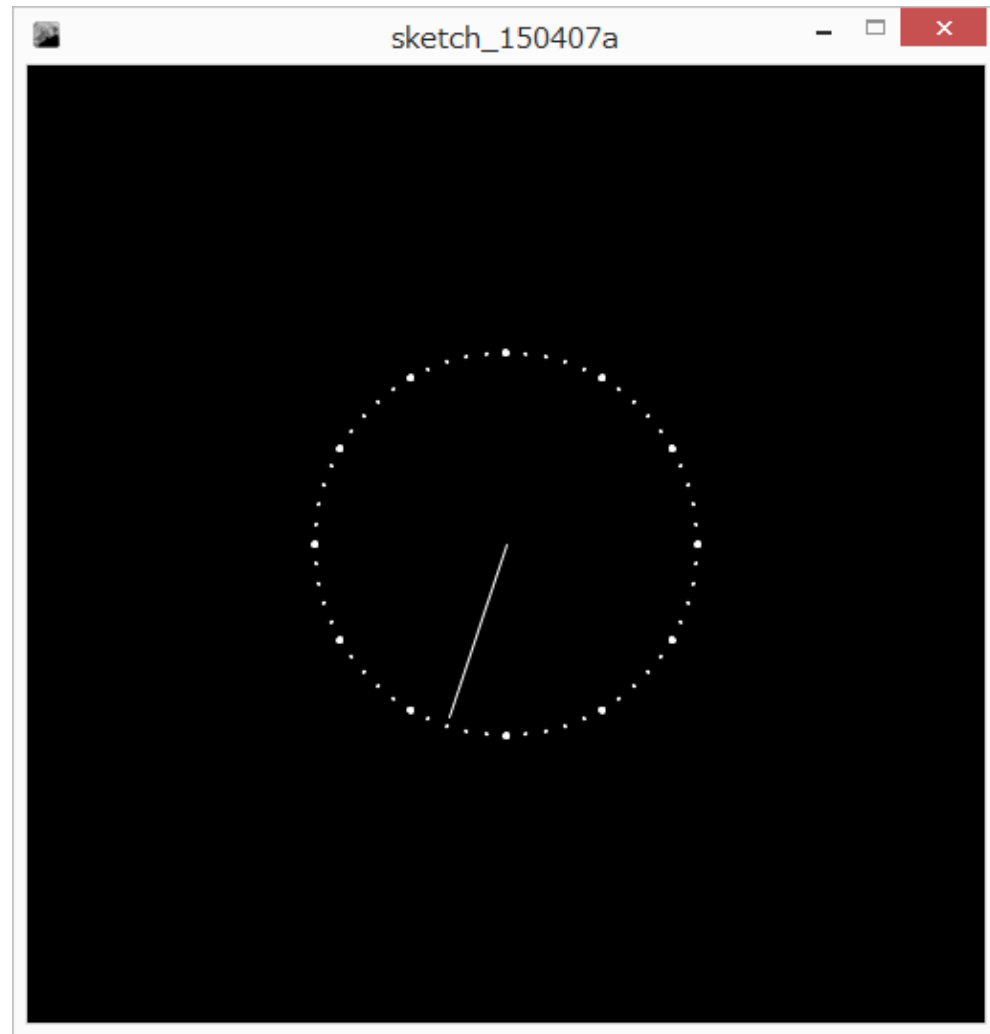
Example: clock
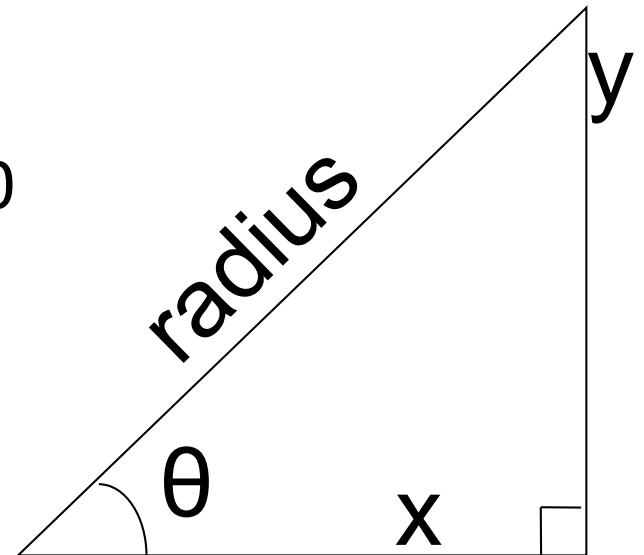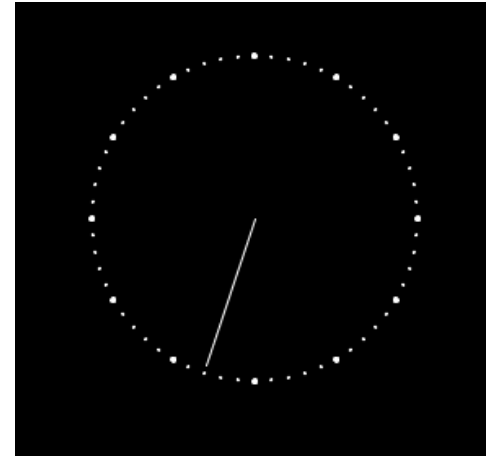
circle of dots

every fifth dot larger

second hand

circle of dots

60 dots

1) Calculate angle to a given dot i
2) Given angle, calculate x and y
   (setup globals for clock)
3) Wrap in a for loop to do for all 60

circle of dots

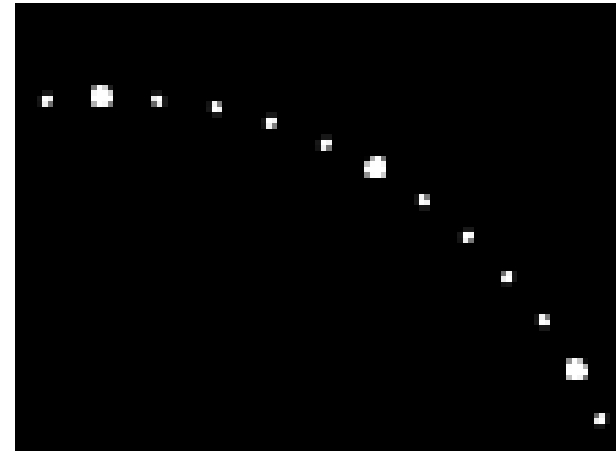How to make every 5th a different size?

Use modulo!

  reminder: number modulo 5, i%5, gives 0 when?

   when i/5 has no remainder.

   i=0, i=5, i=10, …. i=55

   if (i%5 == 0)…

```
int canvasSize = 500;
float bgColor = 0;
float drawColor = 255;

// clock details
float radius = 100;
float ticks = 100;
float tickSpacing = 5;
float clockCenterX = canvasSize/2;
float clockCenterY = canvasSize/2;
float tickSize = 5;
float largeTickSize = 10;

void setup()
{
  size(canvasSize, canvasSize);
}

void draw()
{
  background(bgColor);
  stroke(drawColor);
  fill(drawColor);

  for (int i=0; i<ticks; i++)
  {
    float percent = i/ticks;
    float theta = 2*PI*percent;
    float x = radius*cos(theta)+clockCenterX;
    float y = radius*sin(theta)+clockCenterY;
    if (i%5 == 0)
    {
      ellipse(x, y, largeTickSize, largeTickSize);
    } else {
      ellipse(x, y, tickSize, tickSize);
    }
  }
}
```

Second hand

New command!

int second(); // returns the current seconds from the system clock

map seconds to a corresponding tick mark

Draw the second hand

exercise

Add hour and minute hands

Warning: will require some tricky math to make the hand point in the right direction. E.g., 12:00 should be straight up, but 0 degrees is along the positive x axis.
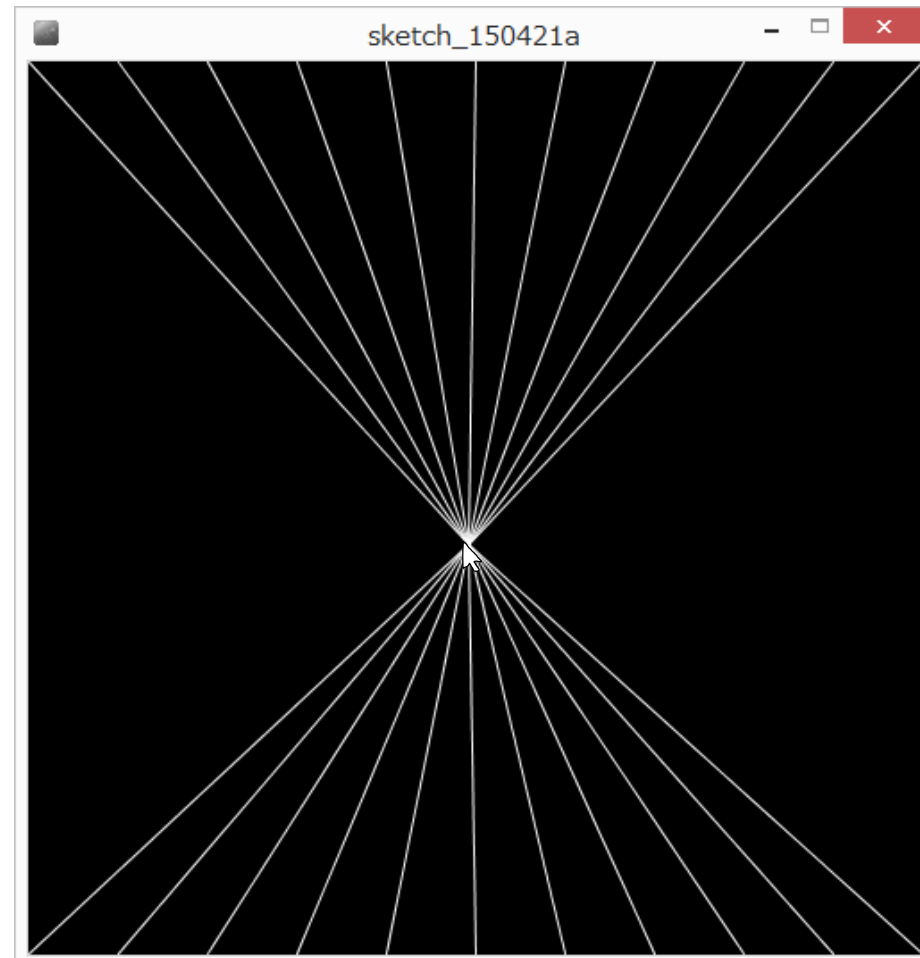
exercise

Smooth the second hand

 - use the millis() command, number of milliseconds since program started

WARNING : not number of milliseconds in minute or second, requires tricky math

Exercise: Use a for loop to implement the following:

Space 50 pixels apart

Make x get bigger by 50 each time in the loop

For loop pitfalls

```
for (int i= 0; i>= 10; i++)
{
// do something
}
```
Loop is never run, because the test is false

For loop pitfalls

```
for (int i= 0; i<= 10; i--)
{
// do something
}
Loop keeps running because i doesn't get > 10
```

For loop pitfalls

```
for (i= 0; i<= 10; i++)
{
// do something
}
```
The variable i is never declared