

# today

Due: Component 4 from Midterm project

Lab for component 5

Functions

Student Presentations

Reading: Ch 7

# Wednesday, Feb 10

Due: Midterm project

Midterm project critique

Introduce Real-life Proposal

~~Student Presentations~~

# functions

It's time to organize our codes with two key principles in **object-orientated programming**:

**Modularity** (code an idea in sections)

**Reusability** (use it again and again)

We have been using pre-defined functions.

```
background(0);  
rect(0,0,100,100);
```

We are calling existing functions.

But, if want to use flower function ...

**flower(x,y);**

It doesn't exist! You have to define it!

# user-defined (custom) functions

syntax:

```
returnType name (_,_,_,_){  
  
}
```

```
void flower() {  
}
```

Where to put this function definition?

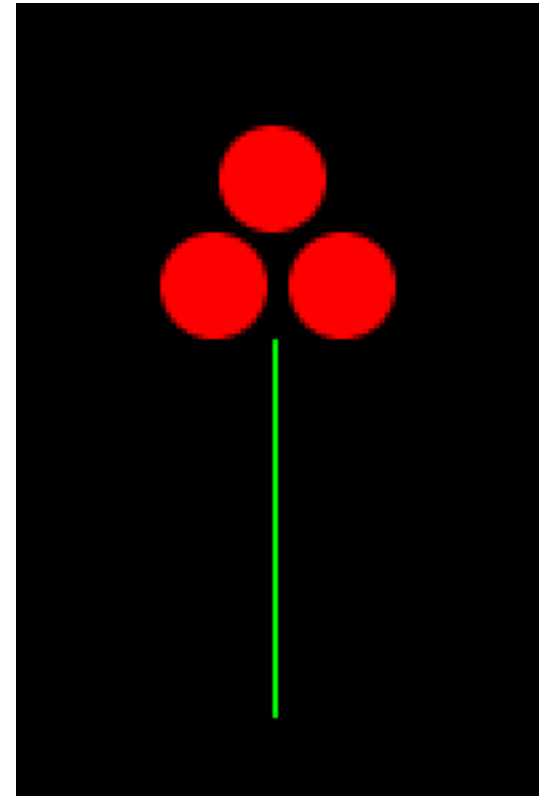
**typically, it goes below setup and draw**

**BUT, IT MUST BE ITS OWN BLOCK  
OF CODE - NOT INSIDE OF draw**

call the flower function from draw

# Define a flower ( ) function

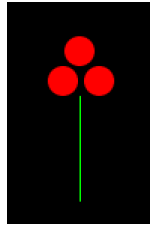
```
void setup () {  
  size (600, 400);  
}  
  
void draw() {  
  background(0);  
  flower();  
}  
  
void flower() {  
  fill(255, 0, 0);  
  noStroke();  
  ellipse(93, 100, 20, 20);  
  ellipse(80, 80, 20, 20);  
  ellipse(69, 100, 20, 20);  
  stroke(0, 255, 0);  
  line (80, 110, 80, 180);  
}
```



sketch\_7\_1\_Function\_basics.pde

## call **flower ( )** function **3 times** **with attributes**

```
void setup () {  
  size (600, 400);  
}
```



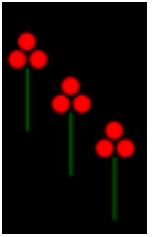
```
void draw() {  
  background(0);  
  flower();  
}
```

```
void flower() {  
  fill(255, 0, 0);  
  noStroke();  
  ellipse(93, 100, 20, 20);  
  ellipse(80, 80, 20, 20);  
  ellipse(69, 100, 20, 20);  
  stroke(0, 255, 0);  
  line (80, 110, 80, 180);  
}
```

```
void setup () {  
  size (600, 400);  
}
```

```
void draw() {  
  background(0);  
  for(int i=1; i<4; i++){  
    flower(50*i, 50*i);  
  }  
}
```

```
void flower(float xLocation, float yLocation) {  
  fill(255, 0, 0);  
  noStroke();  
  ellipse(93+xLocation, 100+yLocation, 20, 20);  
  ellipse(80+xLocation, 80+yLocation, 20, 20);  
  ellipse(69+xLocation, 100+yLocation, 20, 20);  
  stroke(0, 255, 0);  
  line (80+xLocation, 110+yLocation,  
        80+xLocation, 180+yLocation);  
}
```





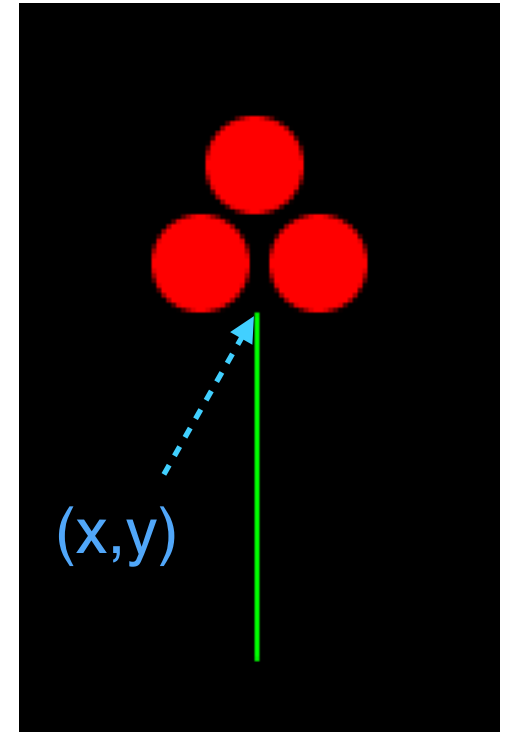
# a better way to write the flower

find a reference point in the graphics

```
ellipse(x+13, y-10, 20, 20);  
ellipse(x, y+30, 20, 20);  
ellipse(x-11, y-10, 20, 20);
```

```
line (x, y, x, y+100);
```

When you need to specify the location for flower (x,y),  
it's easier.



**modular code design:**

[sketch\\_7\\_2\\_Modularity\\_with\\_Functions.pde](#)

## modular code design:

separate each component of the graphic group:

- petals();
- stem();

Or even,

- topPetal();
- leftPetal();
- rightPetal();
- stem();

This way, you have flexibility in design when calling the functions.

# display, animate and evaluation

sketch\_7\_2\_Modularity\_with\_Functions.pde

```
void draw() {  
  background (255);  
  displayBall(); //call the display function  
  moveBall(); //call the move ball function  
  checkEdges(); // call the check edge function  
}  
  
void displayBall() { //display function defined that draws a ball very frame.  
  stroke(0);  
  fill(127);  
  ellipse(x, y, 32, 32);  
}  
  
void moveBall() { //move ball function defined that advances the circle's position.  
  x=x+xspeed;  
  y=y+yspeed;  
}  
  
void checkEdges() { //check edge function defined  
  if (x>width||x<0) {  
    xspeed=xspeed*-1;  
  }  
  if (y>height||y<0) {  
    yspeed=yspeed*-1;  
  }  
}
```

# what does void mean?

functions that don't return a value.

void means - no variable or object type returned.

# functions that returns value

```
void draw() {  
  land(width/2, height/2);  
  text("Pay Jack: $" + area(r), 100, 100);  
}
```

```
void land(float xLocation, float yLocation) { //a function called land with attributes  
  noStroke();  
  fill(0, 200, 0);  
  ellipse (xLocation, yLocation, 20, 20);  
}
```

```
float area(float r) { //a function called area with an attribute  
  float calculateArea=2*PI*r;  
  return calculateArea;  
}
```

## sketch\_function\_void\_return\_values.pde

```
/** Jack gets paid for lease of his circular land.  
Enter an r to see $ amount. */
```

```
float r=200;
```

```
void setup () {  
  size(500, 500);  
  noLoop();  
}
```

```
void draw() {  
  land(width/2, height/2);  
  text("Pay Jack: $" + area(), 100, 100);  
}
```

```
void land(float xLocation, float yLocation) {  
  noStroke();  
  fill(0, 200, 0);  
  ellipse (xLocation, yLocation, r, r);  
}
```

```
float area() {  
  float calculateArea=2*PI*r;  
  return calculateArea;  
}
```

Pay Jack: \$1256.6371



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