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

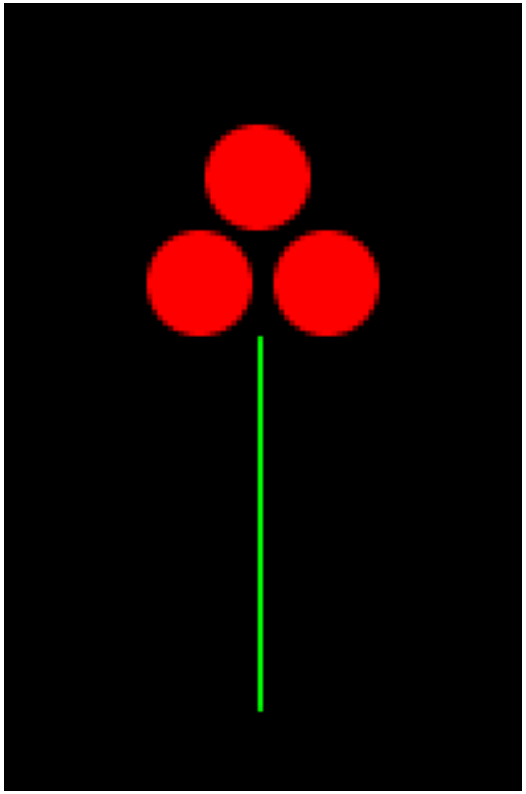
BUT, IT MUST BE ITS OWN BLOCK OF CODE - NOT INSIDE OF draw

call the flower function from draw

sketch_7_1_Function_basics.pde

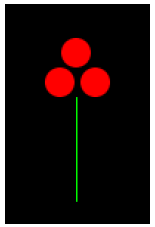
Define a flower ( ) function

```
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



```
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}

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

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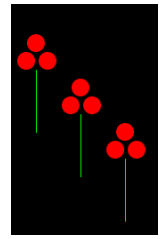



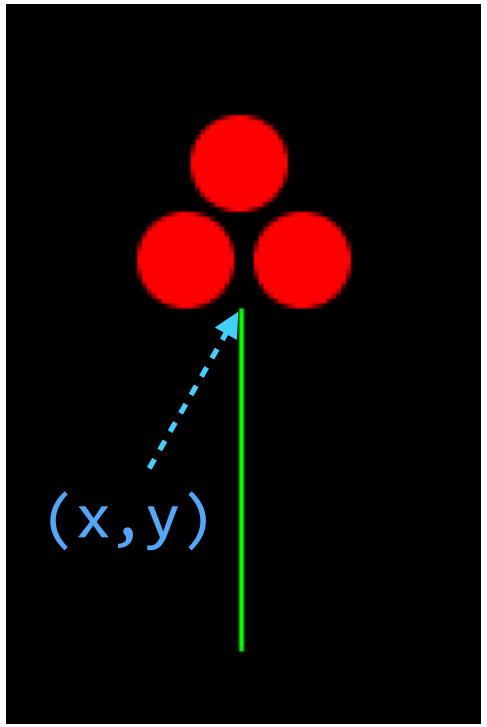
```
void setup () {
    size (600, 400);
}

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?

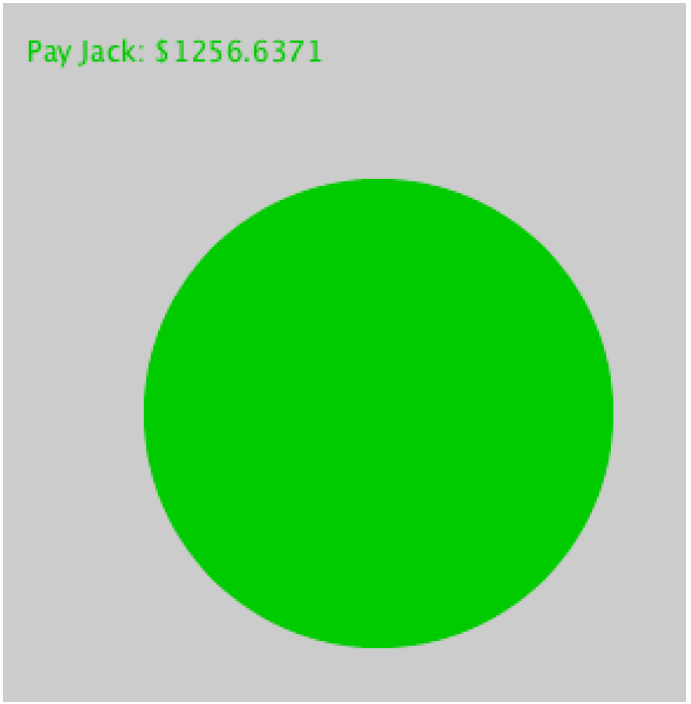
functions that don’t return a value.
void means - no variable or object type returned.

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;
}
```



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