Review
• Loops
  – Condition
  – Index
• Functions
  – Definition
  – Call
  – Parameters
  – Return value

Execution
• Statements are executed one at a time in the order written
• Execution order
  – Globals and initializations
  – setup() called once
  – draw() called repeatedly
  – If any mouse or keyboard events occur, the corresponding functions are called between calls to draw() – exact timing can not be guaranteed.

Variable Scope
• The region of code in which a particular variable is accessible.
• To a first approximation, the scope of a section of your code is demarcated by { and }.
  – Functions
  – Loops
  – Conditionals
• A variable is only accessible/available within the scope in which it is declared.

Variable Lifetime
• Variables cannot be referenced before they are declared.
• A variable is created and initialized when a program enters the block in which it is declared.
  – Functions
  – Loops
  – Conditionals
  – Function parameters
• A variable is destroyed when a program exits the block in which it was declared.

Global variables
• Variables that are declared outside of any scope are considered globals (versus locals).
• Global variables should be declared at the top of your program.
• Do not sprinkle them between functions!

Shadowing
• When there is a name conflict between variables of different scopes
  ```c
  int x = 10;
  void setup() {
    int x = 5;
    int y = x;
  }
  ```
  • The conflicting variables can not have different types (or it’s considered a re-declaration and is not allowed)
  • When shadowed, smaller (inner) scopes have precedence over larger (outer) scopes
```cpp
int a = 20;

void setup() {
  size(200, 200);
  background(51);
  stroke(255);
  noLoop();
}
void draw() {
  line(a, 0, a, height);
  for(int a=50; a<80; a += 2) {
    line(a, 0, a, height);
  }
  
  int a = 100;
  line(a, 0, a, height);
  drawAnotherLine();
  drawYetAnotherLine();
}
void drawAnotherLine() {
  int a = 185;
  line(a, 0, a, height);
}
void drawYetAnotherLine() {
  line(a+2, 0, a+2, height);
}
```

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**Basics of Trigonometry**

- What is drawn?

**Definition**

- \( \sin(\theta) = \frac{o}{h} \)
- \( o = h \cdot \sin(\theta) \)
- \( \cos(\theta) = \frac{a}{h} \)
- \( a = h \cdot \cos(\theta) \)
- \( \tan(\theta) = \frac{a}{o} = \frac{\sin(\theta)}{\cos(\theta)} \)

**Trigonometry on a unit circle**
Drawing points along a circle

```c
int steps = 8;
int radius = 20;
float angle = 2*PI/steps;

for (int i=0; i<steps; i++) {
    float x = cos(angle*i)*radius;
    float y = sin(angle*i)*radius;

    // draw a point every 1/8th of a circle
    ellipse(x, y, 10, 10);
}
```