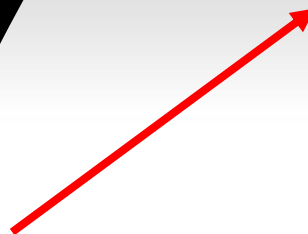




# STEAM CLOWN™ PRODUCTIONS

## ARDUINO STEAM ACADEMY



Art without Engineering is dreaming. Engineering without Art is calculating.

- Steven K. Roberts



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# CONTROL STRUCTURES



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# PROGRAM STRUCTURE AND CONTROL

- Program Structure
  - Define Variables
  - Setup
  - Loop
- Controlling Program Flow
  - **if**
  - **if...else**
  - **for**
  - switch case
  - **while**
  - **do... while**
  - break
  - continue
  - return
  - goto



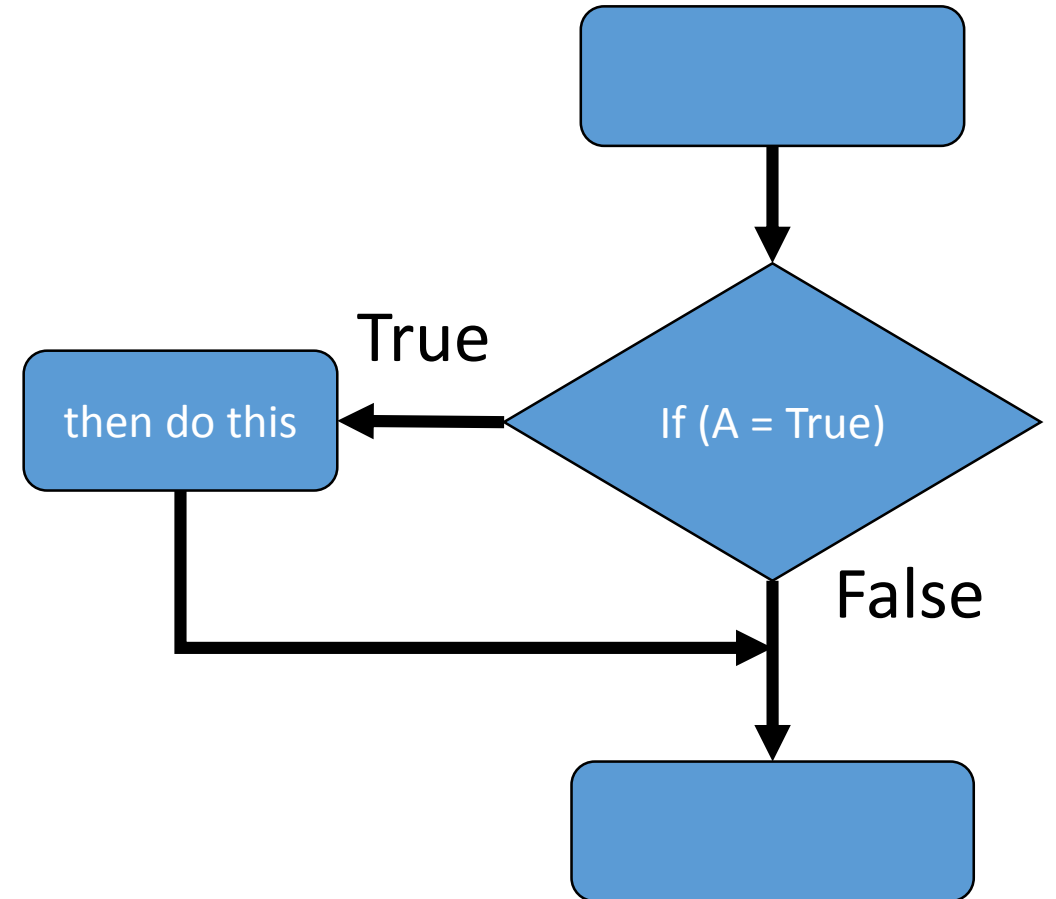
# IF STATEMENT

```
If (Statement Evaluated As True)
{
    //do something here
}
```

```
If (someVariable == 50)
{
    //do something here
}
```

```
If (someVariable > 50)
{
    //do something here
}
```

```
If (someVariable == anotherVariable)
{
    //do something here
}
```

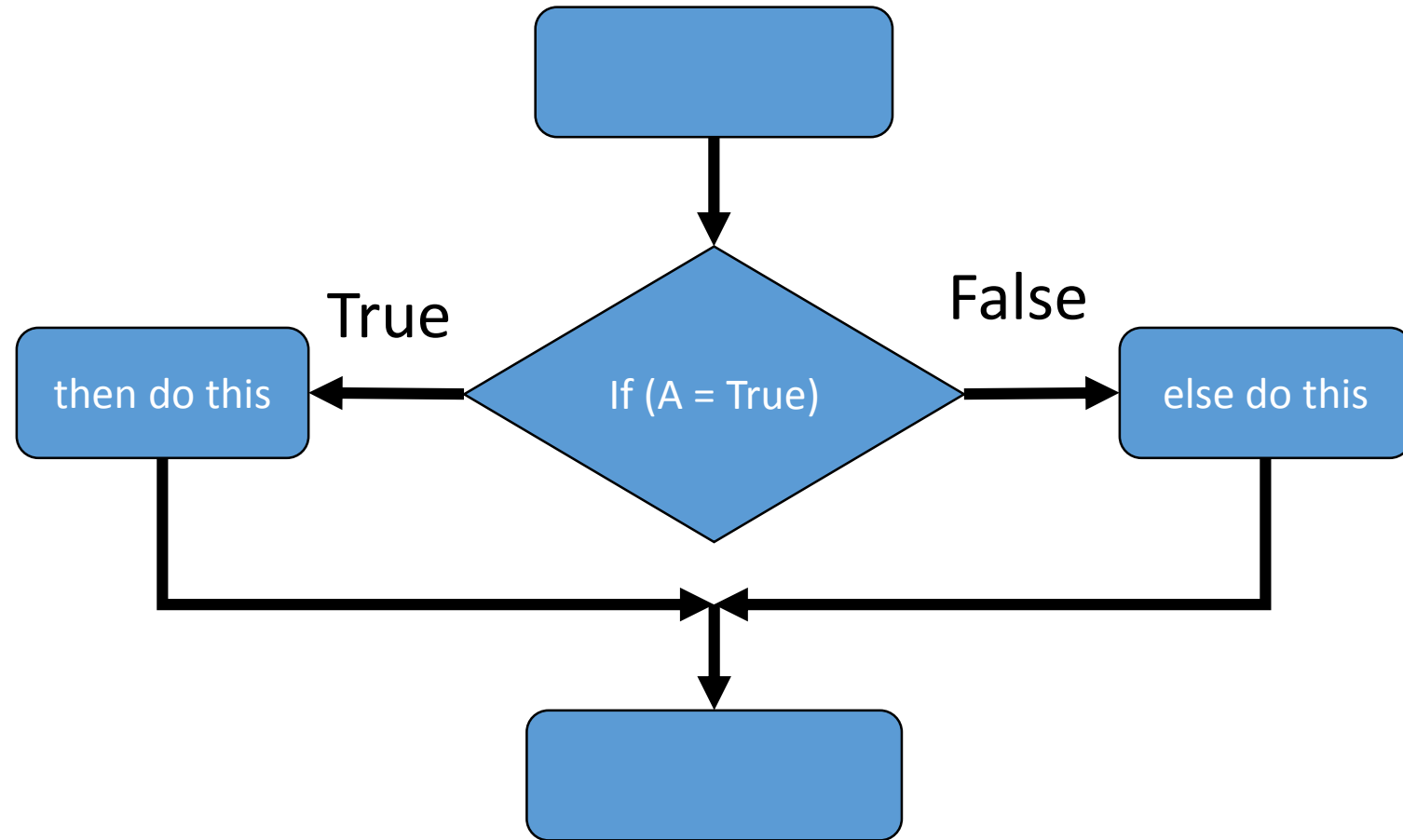


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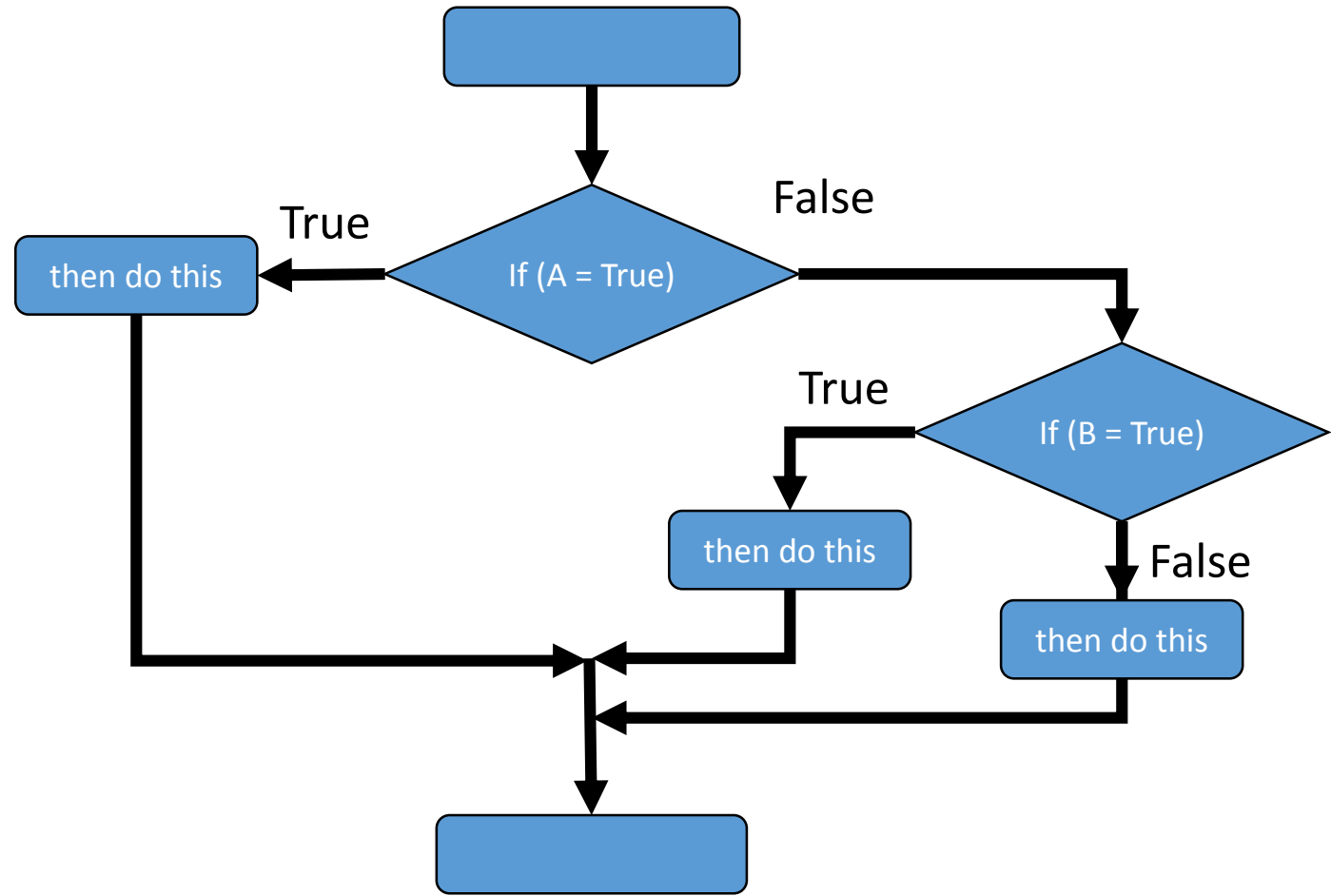
# IF ELSE STATEMENT

```
if (someVariable < 500)
{
    // action A
}
else
{
    // action B
}
```



# IF ELSE STATEMENT

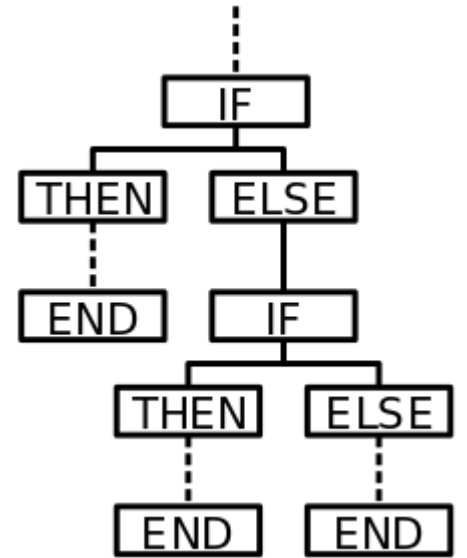
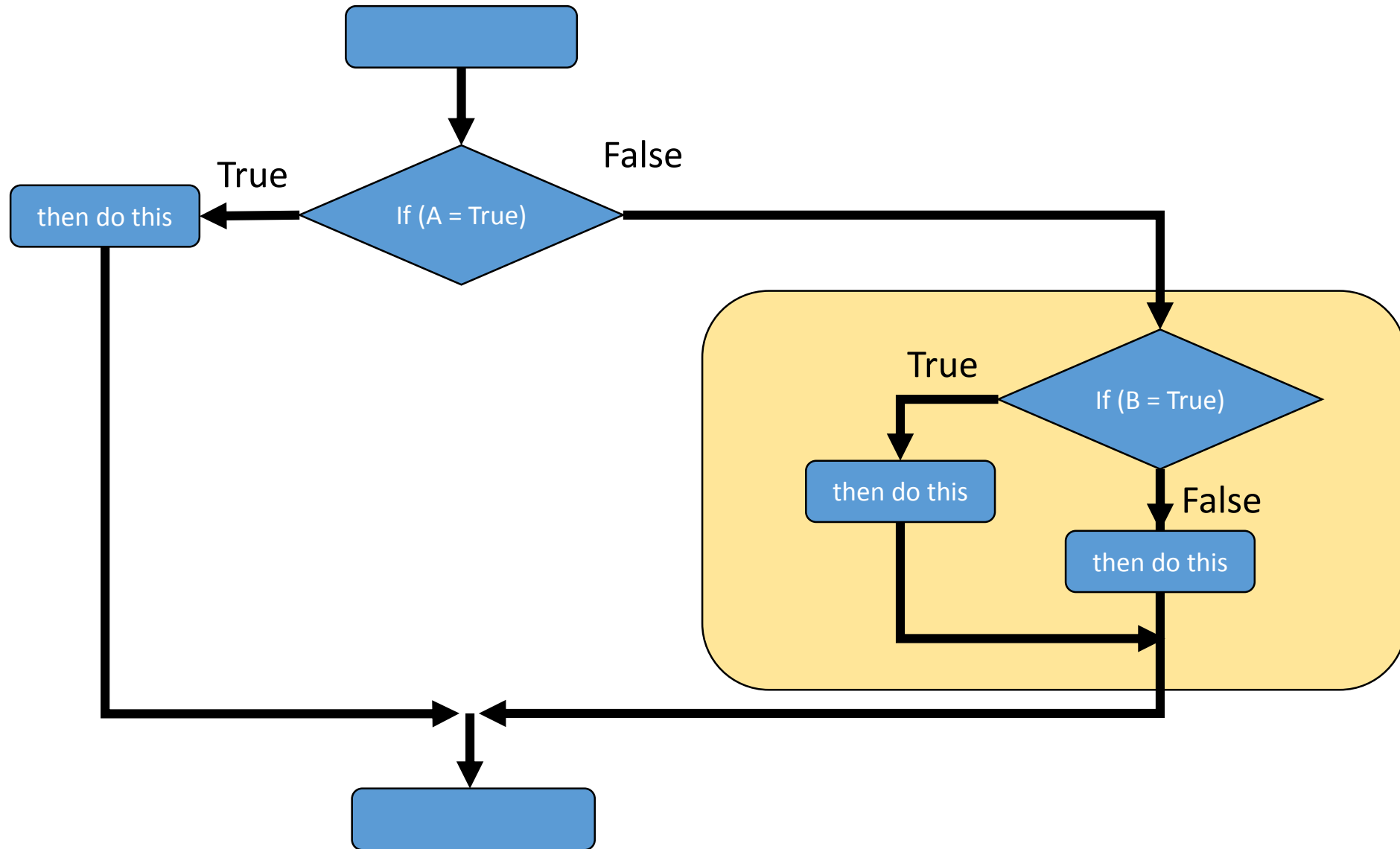
```
if (someVariable < 500)
{
    // do Thing A
}
else if (someVariable >= 1000)
{
    // do Thing B
}
else
{
    // do Thing C
}
```



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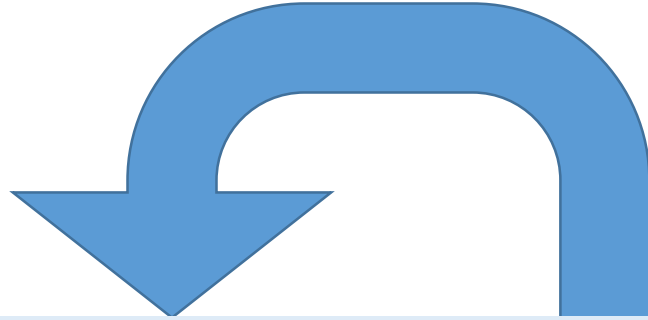
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# NESTED IF ELSE STATEMENT





# WHAT CAN BE IN A CONDITIONAL STATEMENTS



```
if (endOfWorld == TRUE && zombies > 1000000)
{
    // write code to find stuff// ...
}
```

```
if (digitalRead(2) == HIGH && digitalRead(3) == HIGH)
{
    // read two switches // ...
}
```

If the conditional statement resolves to “TRUE”



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# IF STATEMENT

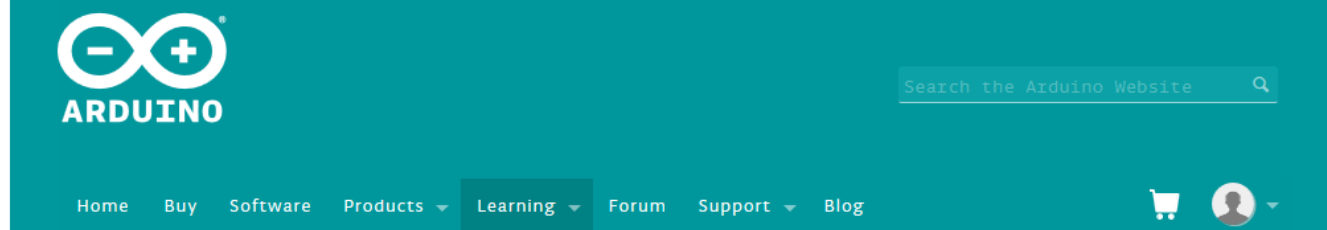
```
If (someVariable >50)
{
  //do something here
}
```

- Search for “if\_1” sketch
  - [pushButton LED 1 STEAMClown](#)
  - [pushButton LED 2 STEAMClown](#)
  - [pushButton LED 3 STEAMClown](#)
  - What does this sketch do?
- Comparison Operators
- Lets Change it...
  - How could we change it?
  - Look back at the “Debug” Sketch

```
digitalWrite(arduinoBoardLED, HIGH);
delay(myDelayTime);
digitalWrite(arduinoBoardLED, LOW);
delay(myDelayTime);
Serial.print(".");
myDelayTime = myDelayTime + 20;
  if (myDelayTime > 500)
  {
    myDelayTime = 10;
    Serial.println("R");
  }
```

```
x == y (x is equal to y)
x != y (x is not equal to y)
x < y (x is less than y)
x > y (x is greater than y)
x <= y (x is less than or equal to y)
x >= y (x is greater than or equal to y)
```





[Reference](#) [Language](#) | [Libraries](#) | [Comparison](#) | [Changes](#)

## Language Reference

Arduino programs can be divided in three main parts: *structure*, *values* (variables and constants), and *functions*.

### Structure

- [setup\(\)](#)
- [loop\(\)](#)

#### Control Structures

- [if](#)
- [if...else](#)
- [for](#)
- [switch case](#)
- [while](#)
- [do... while](#)
- [break](#)

### Variables

#### Constants

- [HIGH](#) | [LOW](#)
- [INPUT](#) | [OUTPUT](#) | [INPUT\\_PULLUP](#)
- [LED\\_BUILTIN](#)
- [true](#) | [false](#)
- [integer constants](#)
- [floating point constants](#)

#### Data Types

- [void](#)
- [boolean](#)

### Functions

#### Digital I/O

- [pinMode\(\)](#)
- [digitalWrite\(\)](#)
- [digitalRead\(\)](#)

#### Analog I/O

- [analogReference\(\)](#)
- [analogRead\(\)](#)
- [analogWrite\(\)](#) - *PWM*

[Due & Zero only](#)



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# LETS DO SOME CODING - WRITE YOUR OWN SKETCH

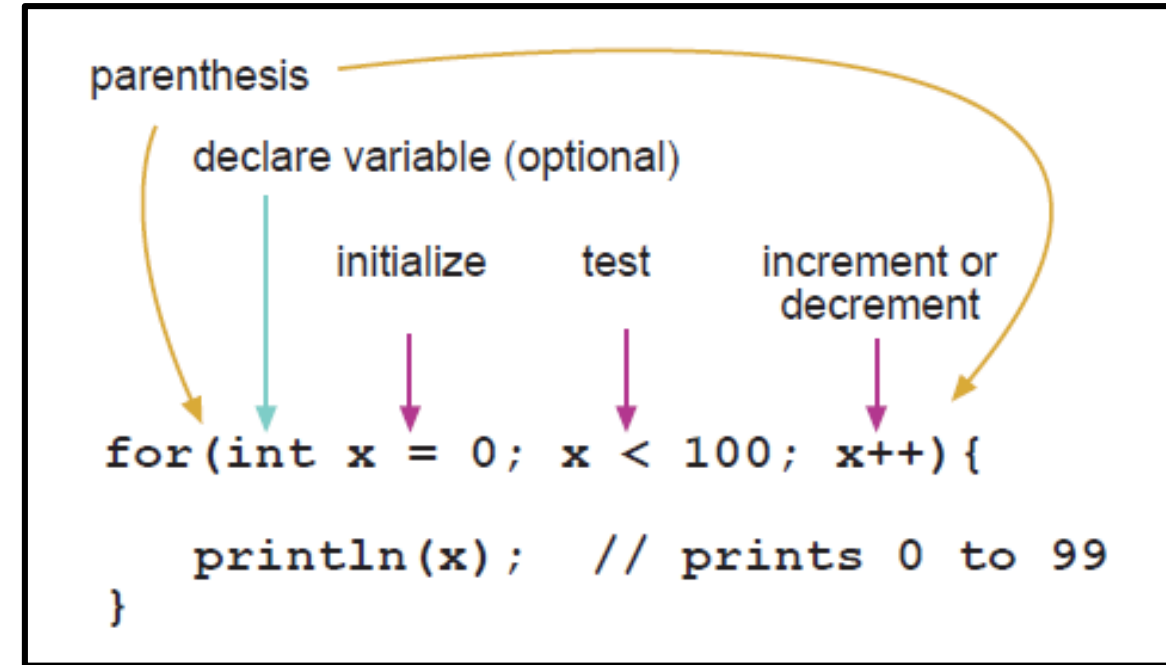
- Review the code in the sketches and code you have done
  - Look at my sketches on [github](#) or other websites
  - Look at coding examples on [www.Arduino.Cc](#)
- Use “if”, “if/then”, “if/then/else” statements
- Make the LED blink differently based on your program control
- Before you start coding... plan it out in your lab book
- Ask me how to turn it it....



# FOR LOOP STATEMENT

- Loop “for” some time...
- What does this code do?
- Why would you use code like this?
- [forLoop STEAMClown](#)

```
for (int i = 0; i < 20; i ++)  
{  
  digitalWrite(ledPin, HIGH);  
  delay(delayPeriod);  
  digitalWrite(ledPin, LOW);  
  delay(delayPeriod);  
}
```



```
for(int x = 2; x < 100; x = x * 1.5)  
{  
  println(x);  
}
```



# WHILE AND DO WHILE LOOP STATEMENT

- Do Something “While” statement is “TRUE”

```
while(expression)
{
    // statement(s)
}
```

```
do
{
    // statement(s)
} while(expression)
```

```
var = 0;
while(var < 200)
{
    // do something repetitive 200 times
    var++;
}
```

```
var = 0;
do
{
    // do something repetitive 201 times
    var++;
} while(var < 200)
```

- What if we set var = 1;



# WHILE AND DO WHILE LOOP

- Search for whileLoop STEAMClown
- What are these loops doing?
- Are they different?

```
loopCounter = 1;
// while(loopCounter != 10)
while(loopCounter < 10)
{
    delayTime = 200;
    digitalWrite(arduinoBoardLED, HIGH);
    delay(delayTime);
    digitalWrite(arduinoBoardLED, LOW);
    delay(delayTime);
    loopCounter++;
}
```

```
do
{
    delayTime = 500;
    digitalWrite(arduinoBoardLED, HIGH);
    delay(delayTime);
    digitalWrite(arduinoBoardLED, LOW);
    delay(delayTime);
    loopCounter++;
}while(loopCounter < 10);
```



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# LETS DO SOME CODING - ADD FOR AND WHILE LOOP

- Review the code in the sketches and code you have done
  - Look at my sketches on [github](#) or other websites
  - Look at coding examples on [www.Arduino.Cc](http://www.Arduino.Cc)
- Create A New Sketch
- Add a “for” Loop and “While” Loop Statements
- Make The LED Blink Differently Based on Your Program Control
- Before you start coding... plan it out in your lab book
- Ask me how to turn it it....







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# APPENDIX



# APPENDIX A: LICENSE & ATTRIBUTION

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# APPENDIX B: ATTRIBUTION FOR SOURCES USED



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# REFERENCE SLIDES



# IS IT POSSIBLE TO GET HELP?

- Git Hub – See [Steam Clown's Files](#)
- <http://www.arduino.cc/> ← Official Arduino Site
- <http://www.arduinobook.com/>
- Google Is Your Friend...
  - Google [Arduino Getting Started](#)
  - Google [Arduino Tutorials](#)
  - Google [Arduino Sketches](#)
- PDF books
  - [Arduino Programmers Notebook](#)
  - [Arduino in a Nutshell](#)
  - [Introduction to Arduino - A piece of cake!](#)
- YouTube
  - [Arduino: Your First Arduino Sketch](#)
  - [Tutorial 01 for Arduino: Getting Acquainted with Arduino](#)

