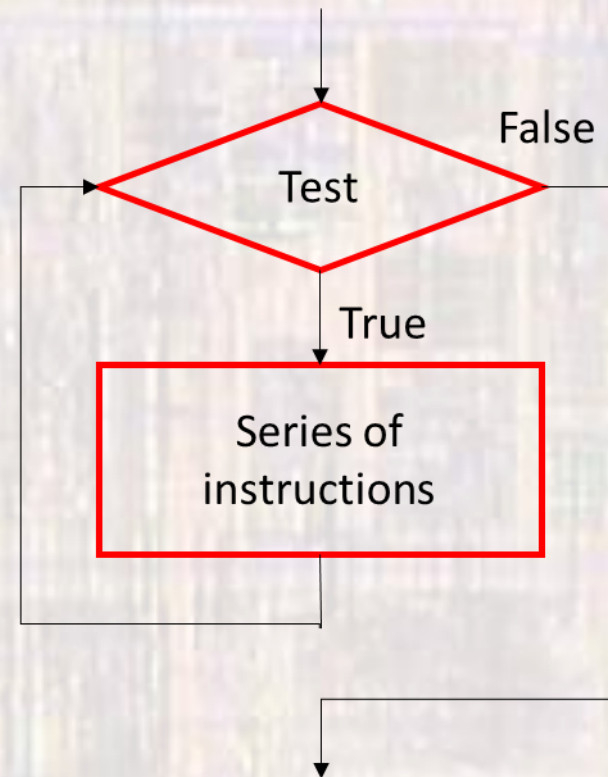# While

Last updated 10/29/20

While

- These slides introduce the while loop

- Upon completion: You should be able to interpret and code solutions using the while loop

While

- While loop

```
while(expression)
    statement;


while(expression){
    statements;
}
```
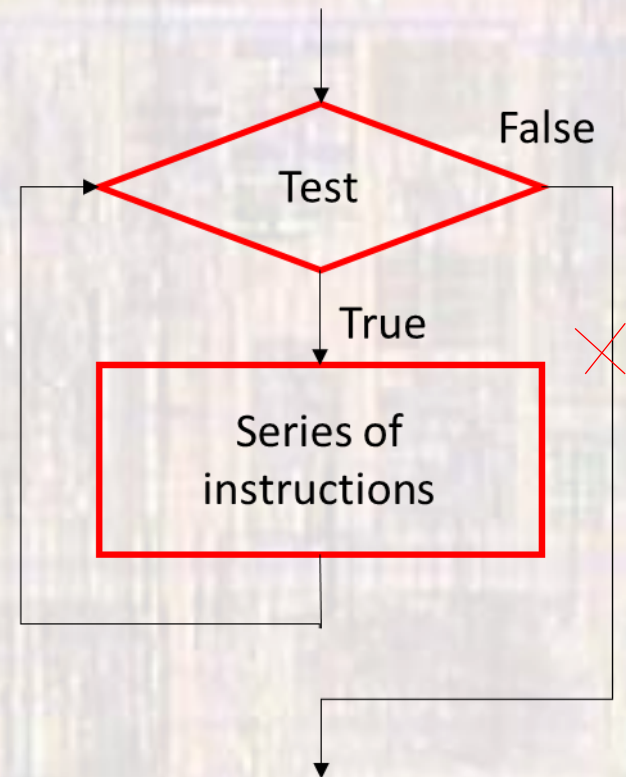

- execute statements while expression is true

While

- While loop

  - Forever

  while(*true*)
     statement
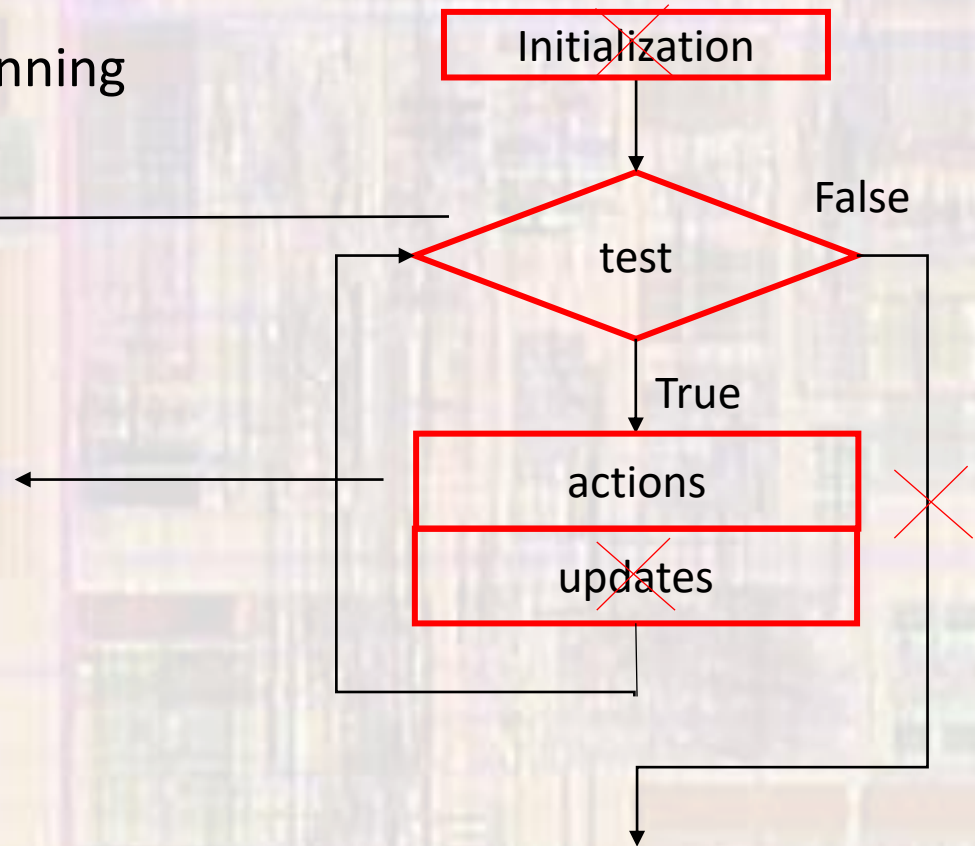
  while(1){
     statements
  }

While

- ## While loop - forever

  - ### Thermostat – always running

```
while(1){
    temp = get_temp();
    setting = get_setting();
    if (temp > setting){
        heater_off();
        ac_on();
    else{
        heater_on();
        ac_off();
    } // end if
} // end while
```

Initialization

test   False

True

actions

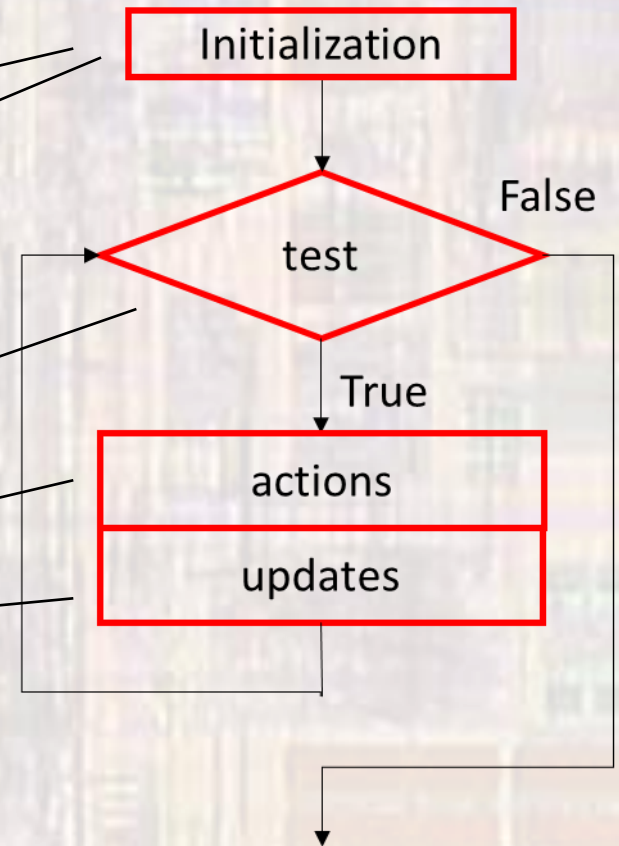updates

While

- While loop - conditional

  - Factorial – num!

```
int fact(int num){
    int fact;
    fact = 1;
    while(num > 0){
        fact = fact * num;
        num--;
    } // end while
    return fact;
} // end fact
```

Full Loop

Initialization

test   False

True

actions

updates

While

- ## While loop - conditional
  - ### Copy pin 3 input to pin 4 as output when pin 5 is high
    pin 3 -> P3_2, pin 4 -> P3_3, pin 5 -> P4_1

```
/*
 * repetition1_msp.c
 *
 *  Created on: Feb 17, 2017
 *      Author: Tim
 */
//  copies input pin to output pin when 3rd pin is high

// Includes
#include "msp.h"

int main(void){
    // Pins
    // note: pin 3 is Port 3 bit 2
    // note: pin 4 is Port 3 bit 3
    // note: pin 5 is Port 4 bit 1
    P3->DIR &= ~0x04;  // set pin 3 to input
    P3->DIR |= 0x08;   // set pin 4 to output
    P4->DIR &= ~0x02;  // set pin 5 to input
```

While

- ## While loop - conditional
  - ### Copy pin 3 input to pin 4 as output when pin 5 is high
    pin 3 -> P3_2, pin 4 -> P3_3, pin 5 -> P4_1

```c
/*
 * repetition1_msp.c
 *
 *  Created on: Feb 17, 2017
 *      Author: Tim
 */
//  copies input pin to output pin when 3rd pin is high

// Includes
#include "msp.h"

int main(void){
    // Pins
    // note: pin 3 is Port 3 bit 2
    // note: pin 4 is Port 3 bit 3
    // note: pin 5 is Port 4 bit 1
    P3->DIR &= ~0x04;  // set pin 3 to input
    P3->DIR |= 0x08;   // set pin 4 to output
    P4->DIR &= ~0x02;  // set pin 5 to input
```

```c
//
// copy pin 3 in to pin 4 out
// when pin 5 is high
//
while(1){
    while(P4->IN & 0x02){    // only copy if Pin5 high
        if(P3->IN & 0x04){
            P3->OUT |= 0x08;
        }
        else{
            P3->OUT &= ~0x08;
        } // end if
    } // end while
} // end while
return 0;
} // end main
```