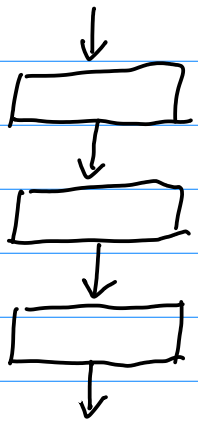
Control Structures

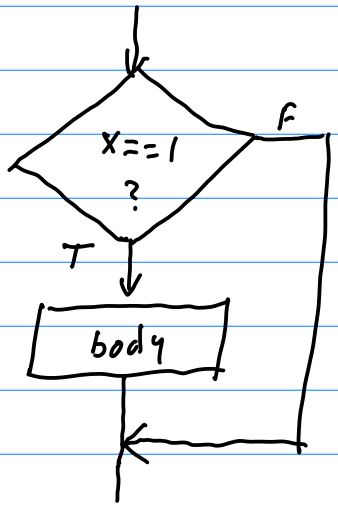
Sequence

flow charts



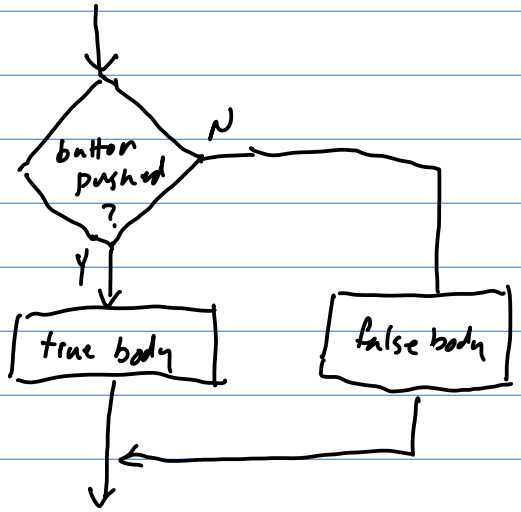
if

```
if (expression) {
    body;
}
```



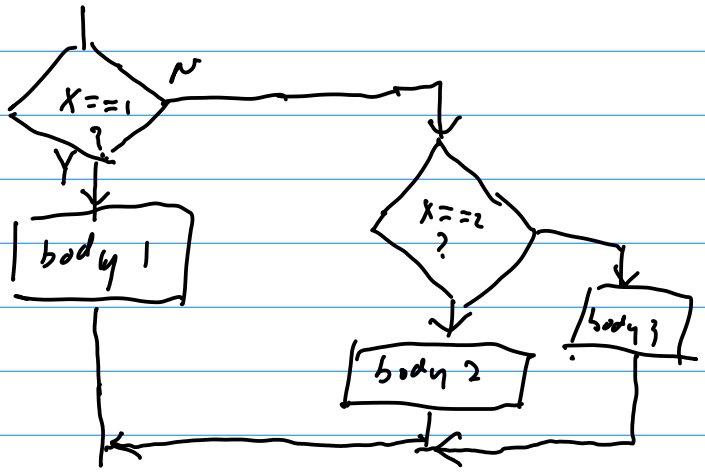
if-else

```
if (expression) {
    true body
}
else {
    false body
}
```



nested if-else

```
if (x==1) {
    body1
}
else if (x==2) {
    body2
}
else {
    body3
}
```

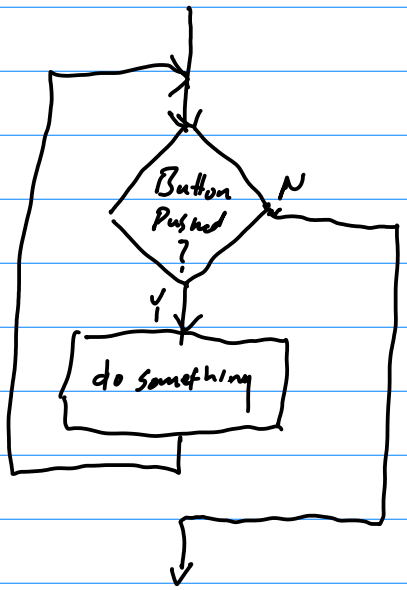


Repetition
while
do-while
for

00000100
2 1 0

while

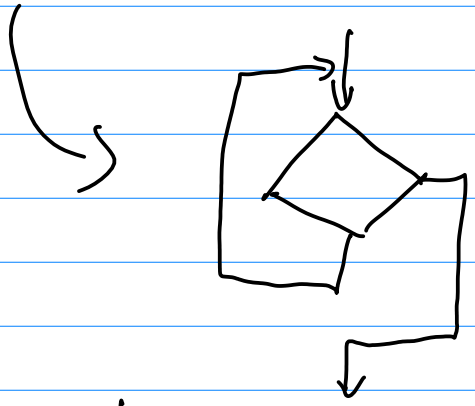
```
while (PORTA & 0x04 == 0x00) {
    do something
}
```



while empty body

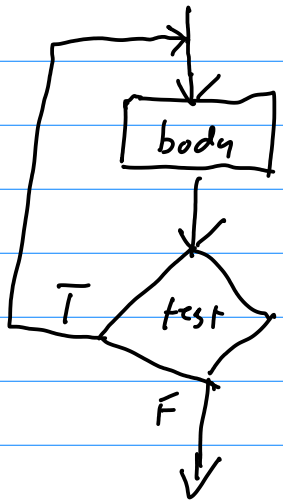
```
while (PORTA & 0x04 == 0x00) { }  // wait for button release
```

```
for ( ; test ; ) {
```



do-while

```
do {
    body
} while (test);
```



```
do {
    get(x)
    do something
} while (x != 0);
```

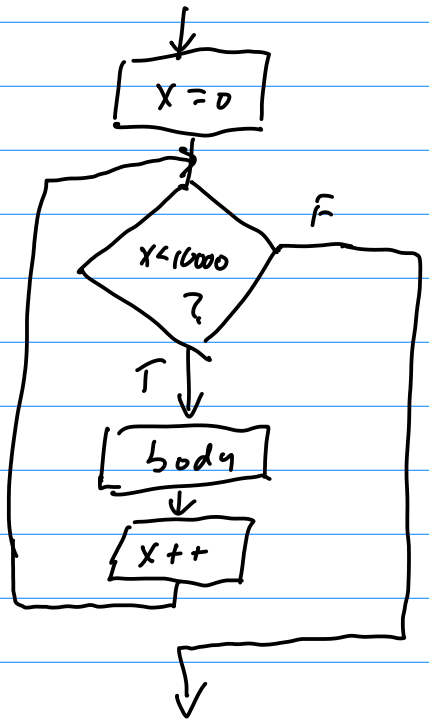
```
x = 42;
while (x != 0) {
    get(x)
    do something
}
```

If initialization is required to "prime" the loop you most-likely should have a do-while

"for" loops generally use a loop-control variable
→ initialize ; test ; update

e.g. counted loop

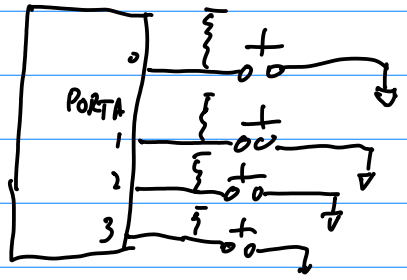
```
for (x=0 ; x < 10000 ; x++) {
        body
}
```



```
char mask;
```

Count the number pushed

```
count = 0;
mask = 0x01;
for (i=0; i<4; i++) {
    if (PORTA & mask == 0) {
        count ++;
    }
}
```



corrected from video

```
count = 0;
for (i=0; i<4; i++) {
    if (PORTA & (0x01 << i) == 0) {
        count ++;
    }
}
```

i	MASK
0	00000001
1	00000010
2	00000100
3	00001000
	0x01 << i
4	00010000
	0x10

```
count = 0
for (mask = 0x01; mask != 0x10; mask <<= 1) {
    if (PORTA & mask == 0) {
        count ++
    }
}
```