

COMP 1010- Summer 2015 (A01)

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Note: the ^ sign does not do power

```
int a = 2^2;
```

This does a *bitwise exclusive or* (advanced topic beyond this course)

Opposite test

We can do code IF something is TRUE

What about if something is not true?

Goal – if the mouse button is NOT pressed, then draw a black circle underneath it to simulate an eraser

boolean operations!: negation

negation!! how can we get the opposite?

true ->false, false -> true

!boolean, the exclamation part negates

```
boolean isJimRich = false;
```

```
boolean isJimPoor = !isJimRich;
```

also known as “not”.

Somewhat confusing...

if (!mousePressed)...

if the opposite of MousePressed is true

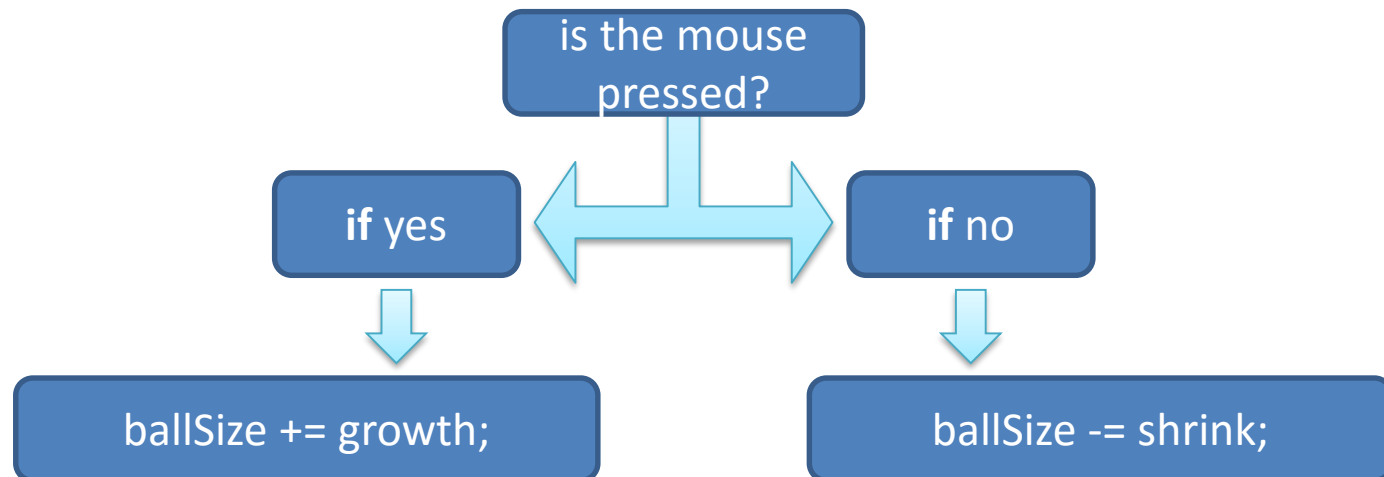
if mousePressed is false

Then draw a black circle!

Growing / shrinking ball

First make a program where a ball grows or shrinks

use the if statement to detect if the mouse is pressed, and act on that



we often do two opposite tests:

```
if (mousePressed)
{
    // do stuff
}
if (!mousePressed)
{
    // do stuff
}
```

Two opposite tests!

it would be useful if we could say: **otherwise**

e.g., if the mouse is pressed, do something,
otherwise, do something else

Processing has the **else** keyword to do this!

```
if (mousePressed)
```

```
{ //... }
```

```
else
```

```
{ //... }
```

} this code is ONLY run if the boolean test
above is FALSE.

if-then-else

```
if (boolean test) {  
  // then do all this stuff..  
  ...  
} else {  
  // otherwise do all this stuff.  
}
```

Update the program

Make a ball move left if the mouse is
pressed,
right otherwise

Up if keypressed, down otherwise

Don't clear the BG, and set a stroke color to
leave a trail

nesting ifs...

in computer programming, **nesting** is when you put one thing inside of another

Let's update our drawing program.

Previously: press a key clears the canvas to black

Let's make it so that if you press a key while the mouse is down, clear to white

Previous code

```
if (mousePressed)
{
  stroke(255);
  line(pmouseX, pmouseY, mouseX, mouseY);
} else {
  stroke(0);
  fill(0);
  ellipse(mouseX, mouseY, 25, 25);
}
```

```
if (keyPressed)
{
  background(0);
}
```

How:

Once we check if a key is pressed, make the clear color depend on whether or not the mouse is down.

Use another if statement **INSIDE** the first one

```
if (keyPressed)
{
  if (mousePressed)
  {
    background(255);
  } else {
    background(0);
  }
}
```

Inside the if keyPressed block, so this code is **ONLY RUN** if the keyPressed test is true.

Narrow tunnel vision!
Step by step!

relational operators: comparing data

`==` equals, true if the left and right operands are equal

`a == b` // gives a boolean result

```
int a = 3;
```

```
int b = 3;
```

```
boolean areEqual = (a == b); // brackets not necessary!!
```

Test if the mouse is on the diagonal
and do something – draw a circle

Make Boolean variable that checks

Do if statement based on that

If Booleans are true...?

```
if (mousePressed)
```

```
{
```

```
....
```

```
}
```

```
if (mousePressed==true)
```

```
{
```

```
...
```

```
}
```

relational operator summary

operator	example	true if...
!=	a != b	they are /not/ equals!
<	a < b	true if a is less than b
<=	a <= b	true if a is less than or equal to b
>	a > b	true if a is greater than b
>=	a >= b	.. a is greater than or equal to b

these all return the boolean type

```
boolean result = a < b;
```

relational operator examples

`2 < 5 // true, 2 is less than 5`

`2 <= 5 // true, 2 is less than or equal to 5`

`2 > 5 // false, 2 is not greater than 5`

`2 == 2 // true, 2 is equal to 2`

`2 <= 2 // true, 2 is less than or equal to 2`

`2 >= 2 // true, 2 is greater than or equal to 2`

`2 != 2 // false, 2 is equal to 2`

`2 == (1+1) // true, 2 equals 1+1`

`3 == min(9, 3); // true!`

relational operator examples

$2 * 10 \leq \max(-10, -2)$ // false, 20 is not ≤ -2

$3 == 3 * 1$ // true, $3 == 3!!$

$3 != \min(3, 1)$ // true, $3 != 1!$

Variable not needed for if statement..

```
boolean onDiagonal = (mouseX==mouseY);  
if (onDiagonal)  
{  
    // ...  
}
```

```
if (mouseX == mouseY)  
{  
    // ...  
}
```