## UNUSUAL OPERATORS

Useful, but no analog in mathematics

## AUTO INCREMENT \& AUTO DECREMENT

- Unary operators; each operand must be a variable
- Four operators:
- pre-increment (++v)
- pre-decrement (--v)

```
post-increment (v++)
post-decrement (v--)
```

- Order of operation only important when auto the operation is embedded in a more complex expression
- $\mathrm{v}++$; is the same as ++v ;
- $\mathrm{x}=\mathrm{v}++$; is different than $\mathrm{x}=++\mathrm{v}$;
- The difference is order in which we "use the stored value" compared to when the increment or decrement takes place


## AUTO OPERATORS CONTINUED

$x=10$;

| Operator | Meaning | Result |
| :--- | :--- | :--- |
| $a=x++;$ | $a=x ;$ <br> $x=x+1 ;$ | $a==10$ <br> $x==11$ |
| $a=++x ;$ | $x=x+1 ;$ <br> $a=x ;$ | $a==11$ <br> $x==11$ |
| $a=x--;$ | $a=x ;$ <br> $x=x-1 ;$ | $a==10$ <br> $x==9$ |
| $a=--x ;$ | $x=x-1 ;$ <br> $a=x ;$ | $a==9$ <br> $x==9$ |

## OPERATION WITH ASSIGNMENT

- Just a shortcut
- Left hand operand must be a variable
- op= (+=, -=, *=, /=, \%=, ~=, <<==, and >>=+)
- $\mathrm{x}+=10$;

$$
x=x+10 ;
$$

- i =- 10;
i $=$ i -10 ;
- a /= b;
a = a / b;
- $x$ *= 2;
$x=x$ * 2;
- index $\%=$ size;
index = index \% size;


## CONDITIONAL OPERATOR

- Behaves much like an if-else statement, but forms an expression (i.e., has a value)
- exI ? ex2 : ex3
- if exl is true (i.e., not 0 ), the value of the expression is ex2
- if exl is false (i.e., 0 ), the value of the expression is ex3
- Examples

```
- min = (x < y) ? x : y
- max = (x > y) ? x : y;
- z = (x > y) ? (x + 10) : (y - 10);
```


## sizeof

- Calculates the size, measured in bytes, of a constant, a variable or a data type
- type must be enclosed in parentheses
- constants and variables may be in parentheses or not
- easiest for me to remember to just us parentheses
- sizeof(int)
- sizeof(double)

```
- sizeof(5)
sizeof 5
```

- sizeof(x) sizeof x

