CS 160
CS Orientation

Expressions, Data Types, & Input/Output
# Expressions and Equations

## Literals or Variables

<table>
<thead>
<tr>
<th>Expressions</th>
<th>Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A + B$</td>
<td>$C = A + B$</td>
</tr>
<tr>
<td>$A$ and $B$ are numeric. The resultant is numeric and is not stored.</td>
<td>$C$, $A$, and $B$ are numeric. The resultant is stored in $C$.</td>
</tr>
<tr>
<td>$A &lt; B$</td>
<td>$C = A &lt; B$</td>
</tr>
<tr>
<td>$A$ and $B$ are numeric, character, or string. The resultant is logical and is not stored.</td>
<td>$A$ and $B$ are numeric, character, or string. The resultant is stored in $C$; $C$ is logical.</td>
</tr>
<tr>
<td>$A \text{ OR } B$</td>
<td>$C = A \text{ OR } B$</td>
</tr>
<tr>
<td>$A$ and $B$ are logical. The resultant is logical and is not stored.</td>
<td>$C$, $A$, and $B$ are logical. The resultant is stored in $C$.</td>
</tr>
</tbody>
</table>

**Operands**: arithmetic, relational, logical

**Assignment operator**: "gets", "is assigned"

**Left side of assignment**: "fetch/lvalue"

**Store/lvalue**: "store/lvalue"
Operators and Their Computer Symbols

- +  add
- -  subtract
- *  multiply
- /  divide
- //  integer division
- %  remainder
- **  exponent

Arithmetic

Python

1/2 = 0.5
1//2 = 0

Integers without
floats, real#

0-3
Demo...

```
kronquii pts/138 10-248-59-54.wir 14:26 1:06m 0.04s 0.04s -bash
collinan pts/142 10-249-97-192.wi 11:58 1:46m 0.24s 0.24s -tcsh
albusaia pts/143 10-249-129-218.w 15:38 1.00s 0.22s 0.16s vim nums.cpp
gonsalvg pts/147 c-98-232-170-206 11:59 2:18m 0.10s 0.08s ssh gonsalvg@eo
nelsonpr pts/148 10-249-44-97.wir 12:02 1:57m 0.24s 0.24s -tcsh
balzac pts/149 c-50-137-146-251 12:03 17:04 0.20s 0.20s -tcsh
tammol pts/153 10-248-61-115.wi 12:04 1:46m 0.78s 0.70s vim rand_number
herrickl pts/154 75.111.50.183 12:36 23:35 0.16s 0.16s -tcsh
cambeku pts/166 c-24-21-114-181. Sun21 0.00s 0.79s 0.77s ssh os-class
flip2 ~ 113% cd cs160/private/
flip2 ~/cs160/private 114% python3
Python 3.2.6 (default, Oct 14 2014, 17:18:04)
[GCC 4.4.7 20120313 (Red Hat 4.4.7-11)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> 1/2
0.5
>>> 1//2
0
>>> 1.0//2
0.0
>>> 1.0//2.0
0.0
>>> exit()
flip2 ~/cs160/private 115%
```
Relational Operators and Symbols

- >
- >=
- <
- <=
- ==
- !=

relate 2 things

equality 2 ≠ 3

not equal to false
Logical Operators and Symbols

- **not**
  - not true false
  - not false true

- **and**
  - true and true → true
  - true and false false
  - false and true false
  - false and false false

- **or**
  - true or true true
  - true or false true
  - false or true true
  - false or false false

\( \text{true} / \text{false} \)
Hierarchy of Operations

• Functions, i.e. math.sqrt()
• Power
• Mod
• Mult, Div
• Add, Sub
• Relational
• Logical
Python Examples

• $5 \times 2 + 3 - 10$
• $5 \times (2 + 3) - 10$
• not True or False
• $3 > 2 + 4$
• True and True or True and False
• ((True and True) or True) and False
• not $3 < 2$ and True or False
Python Demo/Expressions

```python
num = input("Enter a number: "); #input reads a string from user
print(num);
num = num + 1; #this is an error, if we don't change num to an integer
print(num);
```
Python Demo/Expressions

```python
num = int(input("Enter a number: "));  # change the string to an integer
print(num);
num = num + 1;  # now, num holds a number and we can add one
print(num);
```