TOPIC 1
REVIEW OF C++ BASICS

Data types and Selection

Review: Data Types

- Variables are locations in memory
  - Their values are represented by 1's and 0's
  - The format and length of the binary code determines the ***kind*** of data the variable stores
- Data fall into several general categories
  - Whole numbers (0, 1, -8, 10023)
  - Real Numbers (1.0, -6.7, 10e-5)
  - Characters ('a', 'B', "hello world")
  - Boolean Values (true or false)

Boolean Data

- Most data types are familiar:
  - Integers, Double, Char

- Boolean data is limited to having one of two values: **true** or **false**
- Boolean values are used when making *decisions* in programs

Condition Execution

- C++ allows us to *conditionally* execute **blocks** of code

```
if  (  <boolean expression> ) {
       statement 1;
       statement 2;
       …
}
```

statements inside if block **only** execute if the Boolean expression evaluates to `true`

If / else blocks

- Often, we want to do one of two different things, based on a condition
  - Ask the user to enter the sum of randomly generated numbers:
  - **If** correct, congratulate them
  - **Otherwise (else)**, display the correct answer

```
if (  input == correctAnswer ) {
  cout << "Good Job!" << endl;
}
else {
  cout << "Sorry, correct answer is " <<
  correctAnswer << endl;
}
```

If / else if / else blocks

- We can string together multiple if statements with the *else* command:

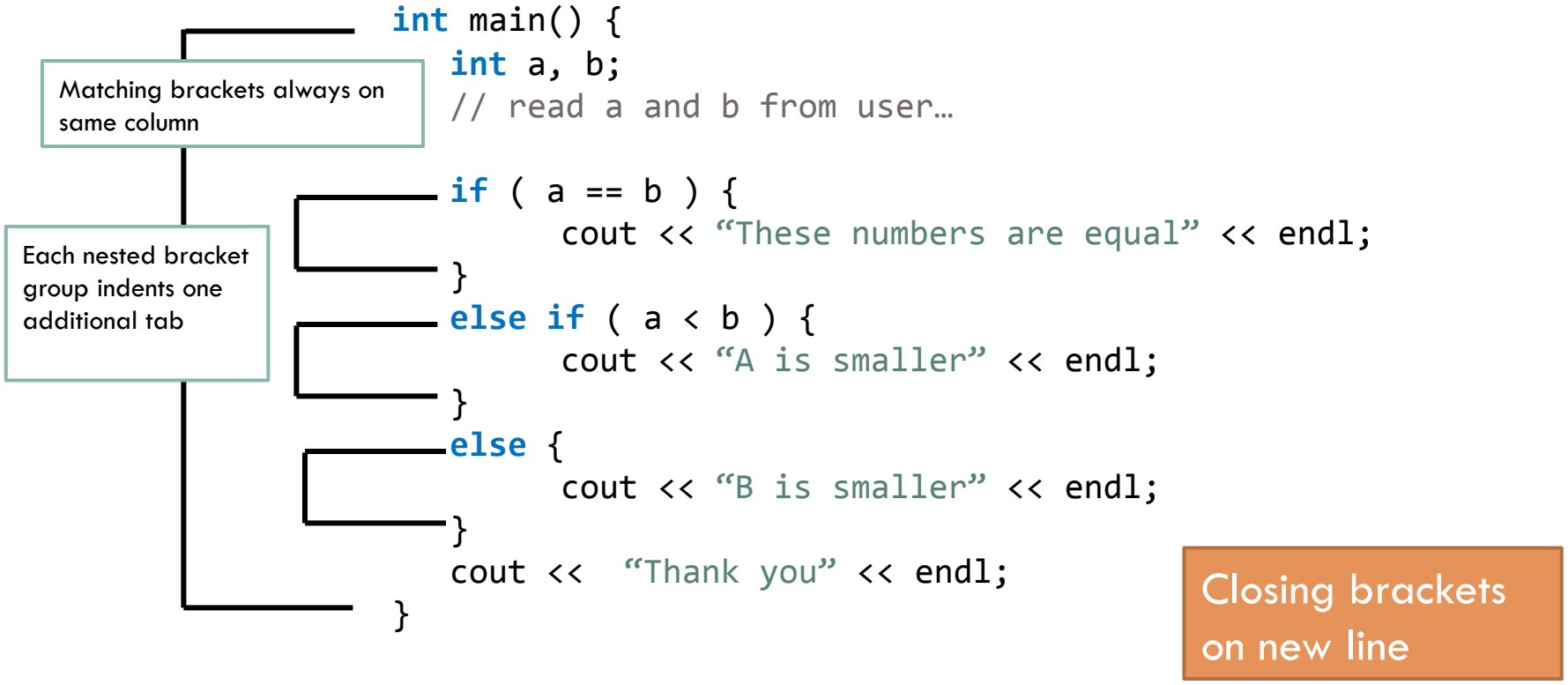
```
if (  <boolean expression> ) {
  …
}
else if ( <boolean expression> ) {

}
else {
  ….
}
```

you can have several else if blocks

Indentation

- Proper indentation of code is **required**
  - **We adopt the following indentation standard (no exceptions!)**



Logical Operators

<boolean expression> **&&** *<boolean expression>* -> *boolean value*

<boolean expression> **||** *<boolean expression>* -> *boolean value*

! *<boolean expression>* -> *boolean value*

Truth Tables

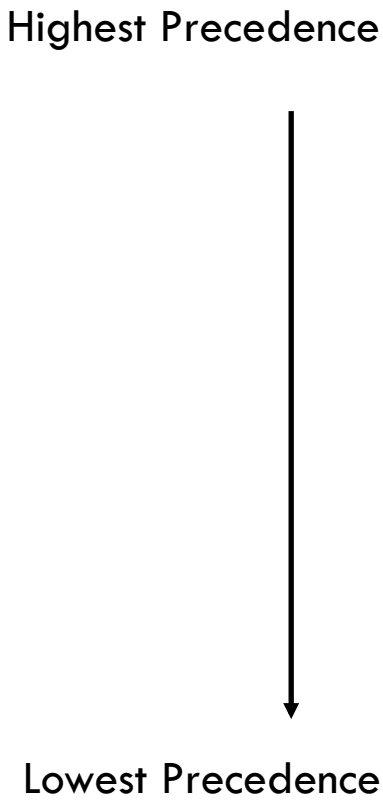
	A	B	A && B
AND	TRUE	TRUE	TRUE
	TRUE	FALSE	FALSE
	FALSE	TRUE	FALSE
	FALSE	FALSE	FALSE

	A	B	A || B
OR	TRUE	TRUE	TRUE
	TRUE	FALSE	TRUE
	FALSE	TRUE	TRUE
	FALSE	FALSE	FALSE

	A	!A
NOT	TRUE	FALSE
	FALSE	TRUE

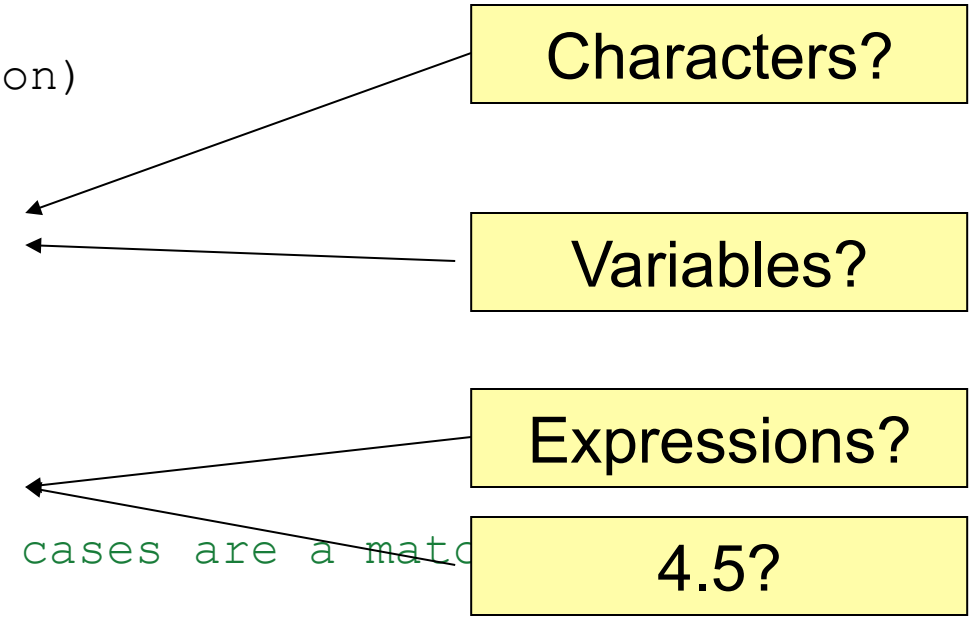
Operator Precedence

```
Parenthesis
!, - (negation)
*, / , %
+, -
<, <=, >=, >
==, !=
&&
||
=
```



Switch Statement

```
switch (IntegerExpression)
{
   case IntegerConstant:
   // statements
        break;
   case IntegerConstant:
   // statements
        break;
   …
   default:
        // execute if no cases are a matc
}
```



If and Switch Relationship

```
if ( x == 5) {
    cout << "1" << endl;
}
else if (x == 6){
    cout << "2" << endl;
}
else if (x == 7) {
    cout << "3" << endl;
}
else {
    cout << "The rest" << endl;
}
```



```
switch ( x ) {
case 5:
    cout << "1" << endl;
    break;
case 6:
    cout << "2" << endl;
    break;
case 7:
    cout << "3" << endl;
    break;
default:
    cout << "The rest" << endl;
}
```

Rules when using Switch

- Be ***extremely*** careful to not omit **`break`** when it should be there!
  - There are times omitting it is actually quite useful however.
  - If **omitted**, always add comment explaining why.

- You cannot compare two *variables* with a switch - you can only compare against **integer or character literals**
  - Booleans also work, but not that useful

Example: Area Calculator

- Ask the user if they want to compute the area of a Rectangle (r), Square (s), or Circle (c)
  - For Rectangle, ask for width and height.
  - For Square, ask for width only
  - For Circle ask for radius

    - *Support upper and lower case*

Lab 1 (appiversity)