Partial Review
CGS3406
Idea/Problem

Computer

Algorithms

Step 1
Step 2
Repeat 1 and 2 until
If user inputs a neg. integer
...

pseudo code
descriptions
...

C++

do {
    foo()
    n()
} while (...);
if x < 0
...

syntax
libraries
...

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do {
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} while (...);
if x < 0
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pseudo code

descriptions
...

syntax

libraries
...
Algorithms and Code

- Abstraction
  - Hide complexity

- Decomposition
  - Break problem down into smaller more manageable pieces
Code

- Create sequence of instructions executed by processor to accomplish some task
- Programming language
  - C++
- Techniques/skills
  - Debugging
  - Refining algorithm/problem
  - Decomposition/abstraction
  - ...
C++ Types

• Values and operations
• Types express valid and results of operations
  2+2, 2/4, 2.0/4

• C++ types
  – Built-in (primitive) types
    • built into the language
    • int, float, char, ...
  – User-defined types
    • Classes
    • Enumerations
    • typedef definitions
    • Structures
C++

Statements

- Statements;
  - Simple;
    - Null
    - Expressions
      - Evaluations
      - E.g., function calls
  - Compound {}
  - Selection (conditional)
  - Repetition
  - Jump
  - Declaration

\[ \text{stmt}_1 \]
\[ \text{stmt}_2 \]
\[ \text{stmt}_3 \]
\[ \text{stmt}_4 \]
\[ \text{stmt}_5 \]
\[ \text{stmt}_6 \]
\[ \ldots \]
\[ \text{stmt}_n \]
C++ Execution Flow

- Sequential
  - Default
- Conditionals
- Repetition
- Jump

1. stmt
2. stmt
3. stmt
4. stmt
5. stmt
6. stmt
...
 stmt
Conditionals

```java
if (expression)
    statement
else
    statement

if (expression)
    statement

if (expression)
    statement
else if
    statement
else
    statement
```
Conditionals

```java
switch (expression)
{
    case constant:
        statements
    case constant:
        statements
    ...  (as many case labels as desired)

    default:  // optional label
        statements
}
```
Conditionals

condition-expr ? true-expr : false-expr
Repetition

while (expr)
    statement

doo
    statement
while (expr);

for (initializer-expr; condition-expr; loop-expr)
    statement

for (type : expr)
    statement
Jump

- immediate (non-conditional) transfer of control
- break
  - switch, loops
- continue
  - loops
- return
C++ Operations

- Arithmetic
  - +, -, *, /
- Logical
  - Comparisons
  - Boolean operators
    - &&
    - ||
    - !
- Short circuiting
Type Modifiers

- `const`
- References
- Pointers
- Arrays
Functions

Declaration
return-type function-name( parameter-list );

Definition (and declaration):
return-type function-name( parameter-list )
{
    function-body (declarations and statements)
}

Call
function-name(arguments)
Scope

• In-class discussion