

CSI 33 LECTURE NOTES (Ojakian)

Topic 1: First Day, and Review of Python and C++

OUTLINE

(References: superficial view of ch 8)

1. Course Intro
 2. Review of Python and C++
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1. This Course

- (a) Data structures.
- (b) Algorithms.

2. Starting up ...

- (a) Get Codelab and Dropbox set up.
- (b) You should have Python installed. Also install the C++ Code::Blocks IDE.
- (c) Start HW 0 in Dropbox.

3. Plan for this topic

- (a) **Review Python and C++, emphasizing their similarities**
- (b) Do lots of small programs.

4. Libraries and modules

Your programs in this course should generally work without using outside libraries, etc.

- (a) Can import modules into Python. For us we will mostly need to import nothing
- (b) For C++, can include libraries.
 - i. We will almost always want to include `iostream` for input and output.
 - ii. Often include `string` for working with strings.
 - iii. Sometimes include `typeinfo` to get the types of data.
 - iv. Sometimes include `vector` or `list` when needed.
 - v. In C++: Include `typeinfo` and use `typeid(BLAH).name()` to get string description (in Python: Use command `type(BLAH)`).
 - vi.

PROBLEM 1. *Write Python and C++ examples. Get the types. And try changing the types.*

- (c) Static versus Dynamic fits with Compiled versus Interpreted.
 - i. Variable in C++: reserves a spot of a certain size for the data - so it needs to know how much space is needed (and thus its type)
 - ii. Variable in Python: type can change

5. User input and output

- (a) Python. Output: `print`. Input: `input`
- (b) C++. Output: `cout`. Input: `cin` OR `getline` combined with following conversion commands `stoi`, `stof`: string to int, string to float (etc.)
- (c)

PROBLEM 2. Consider the Python and C++ expressions in the two “Topic 1 Basics” programs. What is printed?

6. Decision statements

PROBLEM 3. In Python and C++, write a program that reads in an integer value (understood to be how old you are), and then prints out your generation.

- *Baby Boomers: Baby boomers were born between 1946 and 1964. They’re currently between 56-74 years old (71.6 million in U.S.)*
- *Gen X: Gen X was born between 1965 and 1980 and are currently between 40-55 years old (65.2 million people in U.S.)*
- *Gen Y: Gen Y, or Millennials, were born between 1980 and 1994. They are currently between 24-39 years old (72.1 million in the U.S.)*
- *Gen Z: Gen Z is the newest generation to be named and were born between 1996 and 2015. They are currently between 5-24 years old (nearly 68 million in U.S.)*

- (a) Loops

PROBLEM 4. In Python and C++, write a program that reads in an integer input and finds the sum of the numbers from 1 up to and including this number.

PROBLEM 5. In Python and C++, write a program that takes input till 0 is inputted, then prints the sum of all the given numbers.

7. Containers

- (a) In Python: list, set, dict
- (b) In C++ (from standard library): vector (also set, unordered map)
- (c) Python is Heterogenous. C++ is Homogeneous.

PROBLEM 6. Look at programs in “Topic 1 Containers” in Python and C++. What do they print?

- (d) 2 typical kinds of for-loops:
 - i. Basic: Integer ranges over some specified values. Do the body of the loop for each specified value in order.
 - ii. Range-based: Range over the items in a container type. Do the body of the loop for each items in the container.

PROBLEM 7. Write a program in C++ to take in user input of floats, till enter is inputted. Then return the mean and the standard deviation.

8. Functions

- (a) C++: specify return type. Python: not.
- (b) C++: specify parameter types. Python: not.

(c) Similar operation of how values sent to function change and do not change

PROBLEM 8. *Look at code in “Topic 1 Functions” in Python and C++ to determine what they print.*

PROBLEM 9. *Write a function in C++ that takes as input: a vector of integers and a single integer. Calling the function returns nothing, but changes the vector so that the integer is added to each entry.*