

# A201/A597 Introduction to Programming I

## First Summer 2007

Lecture Four: Friday May 11, 2007 (Lindley Hall 102)

Announcement: lecture moves to ED1204 starting Monday, through the end of semester.

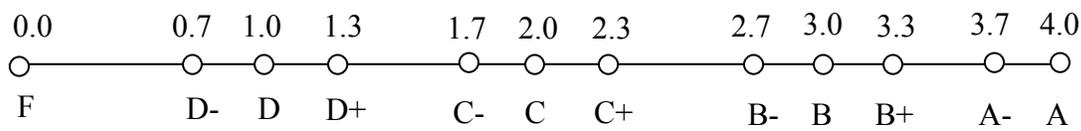
Today we will discuss how to approach problems from Labs 2, 3 and Homework 1, 2.

Let's start with Lab 3.

If you can't be the computer you can't write the program.

So the first step is: be the computer.

We first organize ourselves: letter equivalents are as follows



If somebody gives us a number, can we determine the closest letter grade?

Question: we are being given the number 4.2 what is the closest letter grade?

Answer: the number is to the right of the range [0, 4] so it's either A, A+ or error.

Question: we are being given the number 1.26, what is the closest letter grade.

Answer: the closest cutoff is 1.3, so we convert to a D+.

Question: we are being given the number 2.5 what is the closest letter grade?

Answer: both 2.3 and 2.7 are the closest cutoffs. Problem says choose highest: B-.

So now we know how to solve this problem.

Coding this problem might change our approach a bit: when we determine the closest cutoff above we put the number on the line and look left and right, calculating the distances and choosing the cutoff that is a shorter distance away. The computer can't use this method, but could come close to it.

If we determine the points of equal distance between each pair of letter cutoffs we can split the line in intervals and simply test to see where the number we have been given falls. These points are: 0.35, 0.85, 1.15, 1.5, 1.85, 2.15, 2.5, 2.85, 3.15, 3.5, 3.85. This

generates 12 intervals, that is, 12 possible letter outcomes. We could add to this two more intervals, for A+, or error if the number is above 4.0 or if the number is negative. So these are the intervals and their corresponding translations (conversions):

any number  $> 4.0$  is either A+ or an error  
any number  $\geq 3.85$  and  $\leq 4.0$  is an A  
if the number is  $\geq 3.5$  and  $< 3.85$  the letter is an A-  
if the number is  $\geq 3.15$  and  $< 3.5$  the letter is an B+  
if the number is  $\geq 2.85$  and  $< 3.15$  the letter is an B  
if the number is  $\geq 2.5$  and  $< 2.85$  the letter is an B-  
if the number is  $\geq 2.15$  and  $< 2.5$  the letter is an C+  
if the number is  $\geq 1.85$  and  $< 2.15$  the letter is an C  
if the number is  $\geq 1.5$  and  $< 1.85$  the letter is an C-  
if the number is  $\geq 1.15$  and  $< 1.5$  the letter is an D+  
if the number is  $\geq 0.85$  and  $< 1.15$  the letter is an D  
if the number is  $\geq 0.35$  and  $< 0.85$  the letter is an D-  
if the number is  $\geq 0$  and  $< 0.35$  the letter is an F  
if the number is  $< 0$  the letter is F or we signal error

We could draw a flowchart to describe visually how the program determines the answer.

In class we drew the flowchart and then moved to some of the problems in the first homework assignments. Specifically we discussed strings method `replace` and how we should use it.

We also discussed the boolean type and gave the following truth tables:

p	q	p and q	p or q	not q
true	true	true	true	false
true	false	false	true	true
false	true	false	true	
false	false	false	false	

Some questions and comments:

- can you simplify `p == True`?
- how do you simplify `p == False`?
- is it true that `not (p and q) == not p or not q`?
- same question for `not (p or q) == not p and not q`.