

# CSI 35 LECTURE NOTES (Ojakian)

## Topic 1: Formal Programming

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### OUTLINE

(References: Rosen - 3.1, Appendix 3, 5.5; Python textbook)

1. Algorithms and functions
  2. Expressions: Integer, Decimal, Boolean
  3. Conditional Statements: if, else, elif
  4. Loops: for and while
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1. Recall “Algorithm”
2. Recall Expressions: Boolean, Integer, and Decimal
  - (a) Do examples in Python syntax.
3. Formal Specification of Assignment Statements
  - (a) Simple ones.
  - (b) Ones with the key variable appearing on the right side also.
4. Formal Specification of function
  - (a) Return versus Print (use return unless there is a good reason for printing)
5. Formal Specification of Conditional Statements
  - (a) Single if-statement.
  - (b) if-else statement.
  - (c) if-elif(s)-else statement.

**PROBLEM 1.** Write the definition of a function which takes an integer  $n$  as input and returns  $-1$  if  $n$  is negative,  $0$  if  $n$  is zero, and  $1$  if  $n$  is positive.
6. Formal Specification of for-loops
  - (a) for-loops over some integer range.
  - (b) Changing the step size.

**PROBLEM 2.** Write the definition of a function which takes a positive integer as input and returns the largest integer that divides it evenly.

**PROBLEM 3.** Write the definition of a function which takes two arguments, the first a negative integer  $s$  and the second a positive integer  $t$ . The function returns the sum of the even integers inbetween  $s$  and  $t$  (including  $s$  and  $t$ ).

7. Formal Specification of while-loops

**PROBLEM 4.** *Do one of the above for-loop questions with a while loop.*

**PROBLEM 5.** *Write the definition of a function which takes two inputs:  $a$  and  $b$ . The function returns the integer quotient of  $b$  divided by  $a$ . Write the program with just basic arithmetic operations allowed.*