CMSC105 : Fundamentals of Computer Programming

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Abstract
Some more Scheme, Auxillary Functions, Booleans, Conditionals
Review

Scheme Arithmetic; **define**; First Design Recipe;

- Values (meaning); Variables (names) and Expressions (correct sentences) have values.
- (operation A .. B)
- Definitions and Interactions (Read-Eval-Print)
- (define (f x y)
  some-expression)
- Contract; Purpose; Example; Definition; Tests
Programming Exercise: Variable Definitions and Auxiliary Functions

Develop the function area-pipe. It computes the surface area of a pipe, which is an open cylinder. The program consumes three values: the pipe’s inner radius, its length, and the thickness of its wall.

Develop two versions: a program that consists of a single definition and a program that consists of several function definitions. Which one evokes more confidence?
Programming Lessons

Use Variable definitions for frequently used constants.

Use Auxiliary functions. These can be used elsewhere.
Boolean Values and Expressions

- Boolean Values: true or false
- Boolean expressions with Relational (primitive) Operations: \((= x y), (\langle x y)\) ...
- \((\text{and} \ < boolean-expression-1 > \ ... \ < boolean-expression-N >), \ or, \ not\)
- Aside - \textbf{define, and, or} are special forms since they don't follow the evaluation rule.
- Range-checking: Develop a boolean function that checks if given number lies in a given closed interval
Conditional Expression

- Use boolean expressions to test different conditions to return different results.

- `(cond
  (q a)
  (q a)
  (else a))`

- Examples: 4.3.1, 4.3.2

- Design Recipe for Conditionals: Recognizing need for conditionals (Data Analysis); Identifying cases (Data definitions) ; Function examples and testing need to cover all cases; `cond` questions and answers must cover these cases appropriately.
Programming Exercise: Conditional Functions

Exercise 4.4.1