# CSC148 L5102

Introduction to Computer Science
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## Outline

- More Stack Applications
- Linked Lists
- Mutation



## Parenthesization

It is important that opening and closing parentheses, brackets, and braces match

'(1 + [7 – {8 / 3}])' → Good

'(1 + [7 – {8 / 3}])' → Bad

Remember, the computer only "sees" one character at a time



## Define Balanced Parentheses

- A string with no parentheses is balanced
- A string that begins with a left parenthesis "(", ends with a right parenthesis ")", and in between has balanced parentheses. Same for brackets "[...]" and braces "{...}"
- The concatenation of two strings with balanced parentheses is also balanced



## Exercise

- Design a class that would analyze a string and return True if the string has balanced parentheses
- Write the class API first before adding any codes



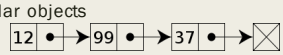
## Why Linked Lists?

- Regular python lists are flexible and useful, but overkill in some situations – they allocate large blocks of contiguous memory, which becomes increasingly difficult as memory is in use.
- Linked list nodes reserves just enough memory for the object value they want to refer to, a reference to it, and a reference to the next node in the list.

## Two Concepts

There are two useful, but different, ways of thinking about linked list nodes

1. As lists made up of an item (value) and a sub-list (rest)
2. As objects (nodes) with a value and a reference to other similar objects




For now, we will take the second point-of-view, and design a separate "wrapper" to represent a linked list as a whole