CS 209
Data Structures and Mathematical Foundations

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Today's Topics

- Questions/Comments?

- References and aliases vs. copying data

- Linked List (simple linear data structure)

  – Definition

  – Process to add Nodes etc.

  – Code to represent a Linked List

  – Code for some common operations on a linked list

references

- References (variables) hold a memory address of where an object lives

- Doing assignment on references only copy a memory address which makes an alias (same as passing in an argument to a function parameter if they are references)

- Note the difference of assigning different types

references

- e.g.

```
a = Card(1,1)        # calls the Card constructor
b = a                # does NOT call constructor
b.set_rank(10)
print(str(a))
print(str(b))
# a and b refer to the SAME Card object
```

Linked Lists

- Linked lists are linear data structures, each element of which is called a Node

Linked Lists

- A Node **has data** and a **next** (which refers to the next Node in the linked list)

- A linked list is maintained as simply a reference to the first Node in the list (named head). That is, it **has a Node** reference named **head**.

- See diagrams on the board.

Linked Lists

- head refers to the first Node in the LinkedList

- Each Node's next refers to the next Node in the LinkedList

- The last-Node-in-the-LinkedList's next has the value None