**Announcements**

Reminders:
- Program 8 has been assigned – Due Tues, Dec. 9th by 11:55pm
- You may work with a partner on Program 8

---

**Dictionaries**

**Dictionary**: object that stores a collection of data
- Each element consists of a **key** and a **value**
  - Often referred to as **mapping** of key to value
  - Key must be an immutable object (cannot be changed!)
- To retrieve a specific value, use the key associated with it
- Format for creating a dictionary:
  
  ```python
  dictionary = {
    key1: val1, 
    key2: val2
  }
  ```

---

**Retrieving a Value from a Dictionary**

- Elements in dictionary are unsorted
- General format for retrieving value from dictionary:
  ```python
  dictionary[key]
  ```
  - If key in the dictionary, associated value is returned, otherwise, **KeyError** exception is raised
- Test whether a key is in a dictionary using the **in** and **not in** operators
  - Helps prevent **KeyError** exceptions
Retrieving a Value from a Dictionary

```python
def main():
    phonebook = {'Chris': '555-1111', 'Katie': '555-3333', 'JoAnne': '555-2222'}
    print(phonebook)
    print("Katie's phone number is: ", phonebook['Katie'])
main()
```

---

Program Output

{'Chris': '555-1111', 'JoAnne': '555-2222', 'Katie': '555-3333'}

Katie's phone number is: 555-3333

---

Adding Elements to an Existing Dictionary

- Dictionaries are mutable objects
- To add a new key-value pair:
  
  ```python
dictionary[key] = value
  ```
  
  — If key exists in the dictionary, the value associated with it will be changed

```python
def main():
    phonebook = {'Chris': '555-1111', 'Katie': '555-3333', 'JoAnne': '555-2222'}
    print("Before Add:", phonebook)
    phonebook['Andy'] = '555-0123'
    print("After Add:", phonebook)
main()
```

---

Program Output

Before Add: {'Chris': '555-1111', 'JoAnne': '555-2222', 'Katie': '555-3333'}
After Add: {'Chris': '555-1111', 'JoAnne': '555-2222', 'Katie': '555-3333', 'Andy': '555-0123'}

---

Deleting Elements From an Existing Dictionary

- To delete a key-value pair:
  
  ```python
del dictionary[key]
  ```
  
  — If key is not in the dictionary, KeyError exception is raised

```python
def main():
    phonebook = {'JoAnne': '555-2222', 'Chris': '555-1111', 'Katie': '555-3333'}
    print("Before Add:", phonebook)
    del phonebook['JoAnne']
    print("After Add:", phonebook)
main()
```

---

Program Output

Before Add: {'JoAnne': '555-2222', 'Chris': '555-1111', 'Katie': '555-3333'}
After Add: {'Chris': '555-1111', 'Katie': '555-3333'}
Deleting Elements From an Existing Dictionary

```python
def main():
    phonebook = {'Chris': '555-1111', 'Katie': '555-3333', 'JoAnne': '555-2222'}
    print("Before Delete:", phonebook)
    del phonebook['JoAnne']
    print("After Delete:", phonebook)
main()
```

Program Output

Before Delete: {'Katie': '555-3333', 'JoAnne': '555-2222', 'Chris': '555-1111'}
After Delete: {'Katie': '555-3333', 'Chris': '555-1111'}

Using a Dictionary as a Color Map

Dictionaries map one value to another. We could map numbers to color names instead of names to phone #s, or to map numbers to images.

Example 1:
```python
```

Practice

• Create an 4 x 4 board (using simplegraphics) (feel free to use a bigger board).
• Write code to correctly determine in which row and column a user clicks the mouse.
• Once a board location has been chosen, mark it somehow so that the user will know it has already been selected.
• You may mark previously selected locations with any shape you'd like.
• Write a function to determine if there are still moves left, and if so, you should continue to let the user click on the board.
• Finally, once you have that working, incorporate a color dictionary (map) into your display_board function (see below) so that you can choose a random color and draw the shape using that color from the color dictionary.
• Hints:
  - You should create a 2-d list of all zeros of size 6x6.
  - Write a function doMove that marks a location as a 1 if it has been clicked.
  - Write a display_board function that has gridlines, and draws a shape in any square that has already been clicked (incorporate a color map).
  - Write a function movesLeft that determines if every square in the board has been clicked, and if so, it returns False, otherwise, it returns True.

Next Time

• More Dictionaries