Functions in Python

Allison N. Tegge
Department of Statistics
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What are functions?

- A way to bundle instructions that you use frequently.
- Allow a program to be more efficient, and more accurate.

- Format of a function:

```
def function_name(parameter1):
    #code to be performed in function
    return result
```

- Functions require a set of parameters. This set can be empty

Example functions

- # Define a function `plus()`

```
def plus(a,b):
    return a + b
```

```
def plus(a,b):
result= a+b
return result
```

```
plus(2,3)
5
```

- # Define a function `hello()`

```
def hello():
    print "Hello, world!"
    return
```

```
hello()
Hello, world!
```

```
# Volume of cube
def cube_volume(length, width, height):
    #Compute volume of cube
    # :param length: length of cube (float/int)
    # :param width: width of cube (float/int)
    #return volume
    return length * width * height
```

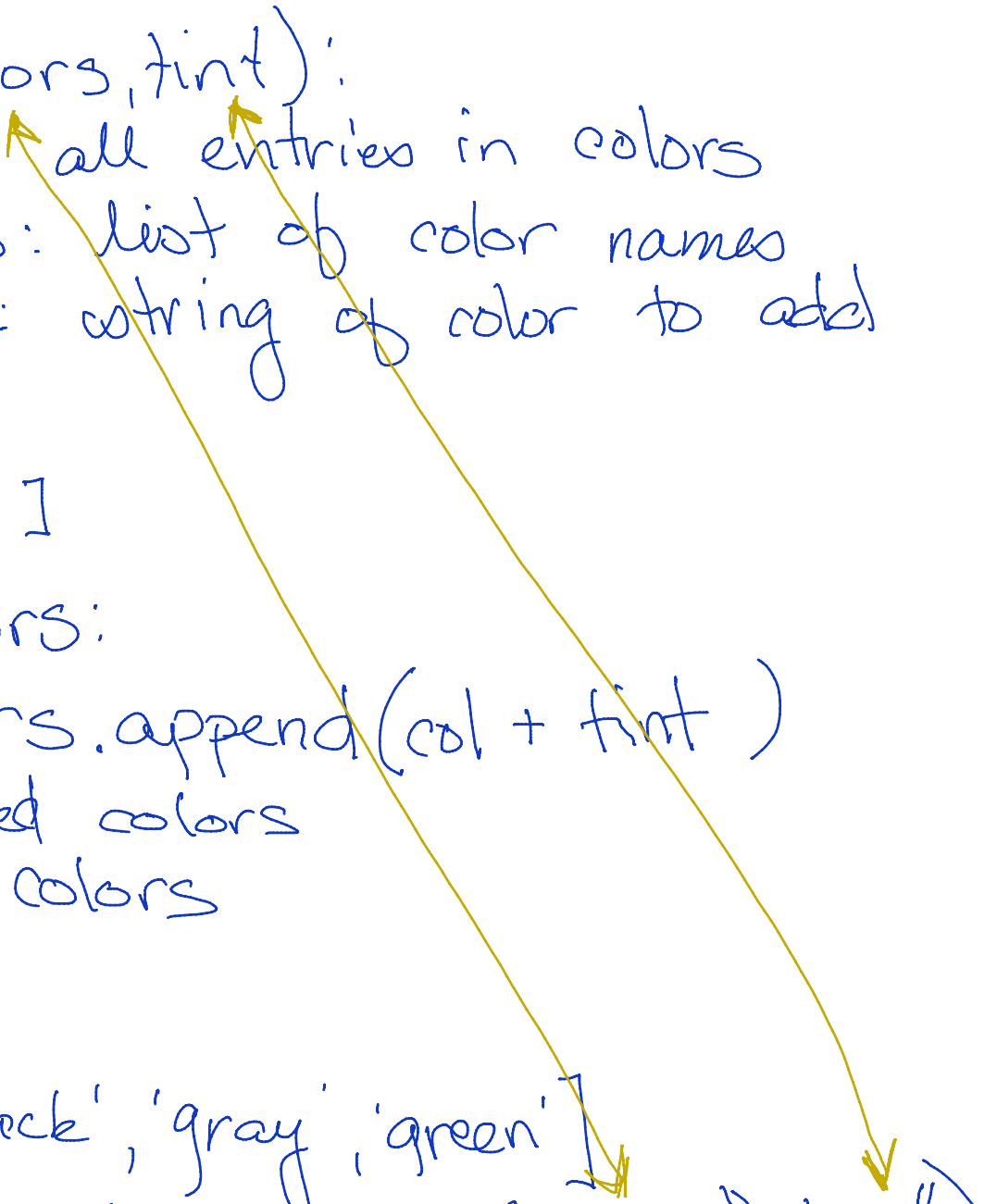
```
print cube_volume(4,4,4)
64
print cube_volume(3,4,5)
60
print cube_volume(4,3,5)
60
```

order does matter!

```
def tint_colors(colors, tint):
    #add "blue" to all entries in colors
    # :param colors: list of color names
    # :param tint: string of color to add


    tinted_colors = [ ]
    for col in colors:
        tinted_colors.append(col + tint )
    #return modified colors
    return tinted_colors


colors = ['red', 'black', 'gray', 'green']
updated_colors = tint_colors(colors, "blue")
red_colors = tint_colors(colors, "red")
```



```
# summarize boxplots                    list    list
def summarize_boxplots(values, groups):
    unique_groups = set(groups)
    for grp in unique_groups:
        subset_values = []
        for i,g in enumerate(groups):
            if g == grp:
                subset_values.append(values[i])
        summarize_boxplot(subset_values)
    return
```

0, A
1, B
2, B
3, A
4, C

```
def summarize_boxplot(values):
    # :param values: list of data
    print "min", min(values)
    print "max", max(values)
    ...
    print "Range", max(values) - min(values)
    return
```

```
def summarize_boxplot(values):
    min_val = min(values)
    max_val = max(values)
    range_val = max_val - min_val
    return (min_val, max_val, range_val)
```

```
groups = ["A", 'B', 'B', 'A', 'C']
values = [1, 2, 3, 4, 5]
summarize_boxplots(values, groups)
```

```
min_val, max_val, range_val =
        summarize_boxplot(values)
```

What about optional keyword parameters?

```
def tint_colors(colors, tint='blue'):
    updated_colors = []
    for col in colors:
        updated_colors.append(col+tint)
    return updated_colors

new_colors = tint_colors(colors)
red_colors = tint_colors(colors, tint='red')
```

```
def tint_multiple(colors, tint='blue', exclude=set()):
    print tint
    updated_colors = []
    for col in colors:
        if col in exclude:
            updated_colors.append(col)
        else:
            updated_colors.append(col+tint)
    return updated_colors

tint_multiple(colors, exclude=set(['green',
                                   'yellow']))

tint_multiple(colors)
tint_multiple(colors, exclude=set(['red']), tint='red')
```

Assignment 3

- Homework 3 will be posted later today
- Due Thursday, February 22
- Cover functions

- This will be a group assignment!