CSci 127: Introduction to Computer Science

Old Business: reverse a string

Purpose: enter a string, then get its reversed version, print the reversed string.

Keys

- Take interactive input from users.
- Find out number of letters of a string.
- Extract each letter from a string.
- Connect each letter in reversed version.

Frequently Asked Questions

From emails.

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Today's Topics

- More on Strings
- Arithmetic
- Indexing and Slicing Lists or Strings
- Colors & Hexadecimal Notation

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- **More on Strings**

- Arithmetic

- Indexing and Slicing Lists or Strings

- Colors & Hexadecimal Notation

More on Strings...

From Final Exam, Fall 2017, Version 1, #1:

1. (a) What will the following Python code print:

```python
s = "FridaysSaturdaysSundays"
num = s.count("s")
days = s[:-1].split("s")
print("There are", num, "fun days in a week")
mess = days[0]
print("Two of them are", mess, days[-1])
result = ""
for i in range(len(mess)):
    if i > 2:
        result = result + mess[i]
print("My favorite", result, "is Saturday.")
```

Output:

More on Strings...

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- Don't leave it blank– write what you know & puzzle out as much as possible.

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- First, go through and write down what we know:

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    There are ??? fun days in a week
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- *Will get* $1/3$ *to* $1/2$ *points for writing down the basic structure.*

More on Strings: String Methods

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s = "FridaysSaturdaysSundays"
num = s.count("s")
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- The first line creates a variable, called s, that stores the string:
  "FridaysSaturdaysSundays"

More on Strings: String Methods

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- There are many useful functions for strings (more in Lab 2).

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  - num = s.count("s") stores the result in the variable num, for later.

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  ▶ What would print(s.count("sS")) output?

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  - ▶ num = s.count("s") stores the result in the variable num, for later.
  - ▶ What would print(s.count("sS")) output?
  - ▶ What about:
    ```
    mess = "10 20 21 9 101 35"
    mults = mess.count("0 ")
    print(mults)
    ```

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```
There are 3 fun days in a week
Two of them are ???
My favorite ???  is Saturday.
```

More on Strings: Indexing & Substrings

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s = "FridaysSaturdaysSundays"
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F	r	i	d	a	y	s	S	a	...	S	u	n	d	a	y	s

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- s[0] is 'F'.

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- s[1] is 'r'.

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- s[-1] is 's'.

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- s[3:6] is

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- s[3:6] is 'day'.

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- s[:3] is

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- s[:3] is 'Fri'.

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- s[:-1] is 'FridaysSaturdaysSunday'.
  (no trailing 's' at the end)

More on Strings: Splits

```
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```

- split() divides a string into a list.

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
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```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

  "Friday✗Saturday✗Sunday"

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

```
"FridayXSaturdayXSunday"
days = ['Friday', 'Saturday', 'Sunday']
```

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

```
"Friday╳Saturday╳Sunday"
days = ['Friday', 'Saturday', 'Sunday']
```

- Different delimiters give different lists:

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

  "Friday✗Saturday✗Sunday"
  days = ['Friday', 'Saturday', 'Sunday']

- Different delimiters give different lists:

  days = s[:-1].split("day")

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

  "Friday✗Saturday✗Sunday"
  days = ['Friday', 'Saturday', 'Sunday']

- Different delimiters give different lists:

  days = s[:-1].split("day")
  "Fri✗✗✗sSatur✗✗✗sSun✗✗✗"

More on Strings: Splits

```
s = "FridaysSaturdaysSundays"
days = s[:-1].split("s")
```

- split() divides a string into a list.
- Cross out the delimiter, and the remaining items are the list.

  "Friday✗Saturday✗Sunday"
  days = ['Friday', 'Saturday', 'Sunday']

- Different delimiters give different lists:

  days = s[:-1].split("day")
  "Fri✗✗✗sSatur✗✗✗sSun✗✗✗"
  days = ['Fri', 'sSatur', 'sSun']

More on Strings...

1. (a) What will the following Python code print:

```
s = "FridaysSaturdaysSundays"
num = s.count("s")
days = s[:-1].split("s")
print("There are", num, "fun days in a week")
mess = days[0]
print("Two of them are", mess, days[-1])
result = ""
for i in range(len(mess)):
    if i > 2:
        result = result + mess[i]
print("My favorite", result, "is Saturday.")
```

Output:

- Don't leave it blank– write what you know & puzzle out as much as possible:

More on Strings...

1. (a) What will the following Python code print:

```python
s = "FridaysSaturdaysSundays"
num = s.count("s")
days = s[:-1].split("s")
print("There are", num, "fun days in a week")
mess = days[0]
print("Two of them are", mess, days[-1])
result = ""
for i in range(len(mess)):
    if i > 2:
        result = result + mess[i]
print("My favorite", result, "is Saturday.")
```

Output:

- Don't leave it blank– write what you know & puzzle out as much as possible:

```
There are 3 fun days in a week
Two of them are Friday Sunday
My favorite ???  is Saturday.
```

Today's Topics

- More on Strings
- **Arithmetic**
- Indexing and Slicing Lists or Strings
- Colors & Hexadecimal Notation

Arithmetic

Some arithmetic operators in Python:

- Addition:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

- Subtraction:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

- Subtraction: `deb = deb - item`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

- Subtraction: `deb = deb - item`

- Multiplication: `area = h * w`

- Division: `ave = total / n`

- Floor or Integer Division:
  `weeks = totalDays // 7`   *15 // 7 = 2*

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`   *15 // 7 = 2*
- Remainder or Modulus:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

- Subtraction: `deb = deb - item`

- Multiplication: `area = h * w`

- Division: `ave = total / n`

- Floor or Integer Division:
  `weeks = totalDays // 7`   *15 // 7 = 2*

- Remainder or Modulus:
  `days = totalDays % 7`   *15 % 7 = 1*

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`
- Subtraction: `deb = deb - item`
- Multiplication: `area = h * w`
- Division: `ave = total / n`
- Floor or Integer Division:
  `weeks = totalDays // 7`   *15 // 7 = 2*
- Remainder or Modulus:
  `days = totalDays % 7`   *15 % 7 = 1*
- Exponentiaion:

Arithmetic

Some arithmetic operators in Python:

- Addition: `sum = sum + 3`

- Subtraction: `deb = deb - item`

- Multiplication: `area = h * w`

- Division: `ave = total / n`

- Floor or Integer Division:
  `weeks = totalDays // 7`   *15 // 7 = 2*

- Remainder or Modulus:
  `days = totalDays % 7`   *15 % 7 = 1*

- Exponentiaion:
  `pop = 2**time`

Side Note: '+' for numbers and strings

- x = 3 + 5 stores the number 8 in memory location x.

Side Note: '+' for numbers and strings

- x = 3 + 5 stores the number 8 in memory location x.

- x = x + 1 increases x by 1.

Side Note: '+' for numbers and strings

- x = 3 + 5 stores the number 8 in memory location x.

- x = x + 1 increases x by 1.

- s = "hi" + "Mom" stores "hiMom" in memory locations s.

Side Note: '+' for numbers and strings

- `x = 3 + 5` stores the number 8 in memory location `x`.

- `x = x + 1` increases `x` by 1.

- `s = "hi" + "Mom"` stores `"hiMom"` in memory locations `s`.

- `s = s + "A"` adds the letter `"A"` to the end of the strings `s`.

Challenge (Group Work):

What does this code do?

```python
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
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print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.

Challenge (Group Work):

What does this code do?

```python
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
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print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.
- If the user enters, 8 and 20.

Challenge (Group Work):

What does this code do?

```python
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
- If the user enters, 12 and 4.
- If the user enters, 8 and 20.
- If the user enters, 11 and 1.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
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duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 9 and 2.
  Enter starting time: 9
  Enter how long: 2
  Your event starts at 9 o'clock.
  Your event ends at 11 o'clock.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 12 and 4.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 12 and 4.

      Enter starting time: 12
      Enter how long: 4
      Your event starts at 12 o'clock.
      Your event ends at 4 o'clock.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 8 and 20.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 8 and 20.
  Enter starting time: 8
  Enter how long: 20
  Your event starts at 8 o'clock.
  Your event ends at 4 o'clock.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 11 and 1.

Challenge (Group Work):

What does this code do?

```
#Mystery code for lecture 3

startTime = int(input('Enter starting time: '))
duration = int(input('Enter how long: '))

print('Your event starts at', startTime, "o'clock.")

endTime = (startTime+duration)%12
print('Your event ends at', endTime, "o'clock.")
```

In particular, what is printed...

- If the user enters, 11 and 1.
  ```
  Enter starting time: 11
  Enter how long: 1
  Your event starts at 11 o'clock.
  Your event ends at 0 o'clock.
  ```

Today's Topics

- More on Strings

- Arithmetic

- **Indexing and Slicing Lists or Strings**

- Colors & Hexadecimal Notation

Challenge (Group Work):

Mostly review:

```
 1  for d in range(10, 0, -1):
 2      print(d)
 3  print("Blast off!")
 4
 5  for num in range(5,8):
 6      print(num, 2*num)
 7
 8  s = "City University of New York"
 9  print(s[3], s[0:3], s[:3])
10  print(s[5:8], s[-1])
11
12  names = ["Eleanor", "Anna", "Alice", "Edith"]
13  for n in names:
14      print(n)
```

Python Tutor

```python
1  for d in range(10, 0, -1):
2      print(d)
3  print("Blast off!")
4
5  for num in range(5,8):
6      print(num, 2*num)
7
8  s = "City University of New York"
9  print(s[3], s[0:3], s[:3])
10 print(s[5:8], s[-1])
11
12 names = ["Eleanor", "Anna", "Alice", "Edith"]
13 for n in names:
14     print(n)
```

(Demo with pythonTutor)

Review: range()

The three versions:

Review: range()

The three versions:

- range(stop)

Review: range()

The three versions:

- range(stop)
- range(start, stop)

Review: range()

The three versions:

- range(stop)
- range(start, stop)
- range(start, stop, step)

Slices

- Similar to `range()`, you can take portions or **slices** of lists and strings:

```
 1  for d in range(10, 0, -1):
 2      print(d)
 3  print("Blast off!")
 4
 5  for num in range(5,8):
 6      print(num, 2*num)
 7
 8  s = "City University of New York"
 9  print(s[3], s[0:3], s[:3])
10  print(s[5:8], s[-1])
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12  names = ["Eleanor", "Anna", "Alice", "Edith"]
13  for n in names:
14      print(n)
```

Slices

- Similar to `range()`, you can take portions or **slices** of lists and strings:

  s[5:8]

  gives: `"Uni"`

```
1  for d in range(10, 0, -1):
2      print(d)
3  print("Blast off!")
4
5  for num in range(5,8):
6      print(num, 2*num)
7
8  s = "City University of New York"
9  print(s[3], s[0:3], s[:3])
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12 names = ["Eleanor", "Anna", "Alice", "Edith"]
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Slices

```
1  for d in range(10, 0, -1):
2      print(d)
3  print("Blast off!")
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5  for num in range(5,8):
6      print(num, 2*num)
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8  s = "City University of New York"
9  print(s[3], s[0:3], s[:3])
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11
12 names = ["Eleanor", "Anna", "Alice", "Edith"]
13 for n in names:
14     print(n)
```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

  `s[5:8]`

  gives: `"Uni"`
- Also works for lists:

Slices

```
 1  for d in range(10, 0, -1):
 2      print(d)
 3  print("Blast off!")
 4
 5  for num in range(5,8):
 6      print(num, 2*num)
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 8  s = "City University of New York"
 9  print(s[3], s[0:3], s[:3])
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- Similar to `range()`, you can take portions or **slices** of lists and strings:

    `s[5:8]`

    gives: `"Uni"`
- Also works for lists:

    `names[1:3]`

Slices

```
1  for d in range(10, 0, -1):
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3  print("Blast off!")
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5  for num in range(5,8):
6      print(num, 2*num)
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12 names = ["Eleanor", "Anna", "Alice", "Edith"]
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- Similar to `range()`, you can take portions or **slices** of lists and strings:

    `s[5:8]`

    gives: `"Uni"`
- Also works for lists:

    `names[1:3]`

    gives: `["Anna", "Alice"]`

Slices

```
1  for d in range(10, 0, -1):
2      print(d)
3  print("Blast off!")
4
5  for num in range(5,8):
6      print(num, 2*num)
7
8  s = "City University of New York"
9  print(s[3], s[0:3], s[:3])
10 print(s[5:8], s[-1])
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12 names = ["Eleanor", "Anna", "Alice", "Edith"]
13 for n in names:
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```

- Similar to `range()`, you can take portions or **slices** of lists and strings:

  `s[5:8]`

  gives: `"Uni"`

- Also works for lists:

  `names[1:3]`

  gives: `["Anna", "Alice"]`

- Python also lets you "count backwards": last element has index: `-1`.

Today's Topics

- More on Strings
- Arithmetic
- Indexing and Slicing Lists or Strings
- **Colors & Hexadecimal Notation**

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by name.

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	
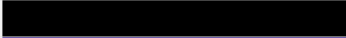
- Can specify by name.
- Can specify by numbers:

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	
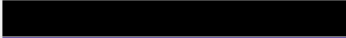
- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:
    - Black: 0% red, 0% green, 0% blue

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by name.
- Can specify by numbers:
  - Amount of Red, Green, and Blue (RGB).
  - Adding light, not paint:
    - Black: 0% red, 0% green, 0% blue
    - White: 100% red, 100% green, 100% blue

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - ▶ Fractions of each:

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - ▶ Fractions of each:
    e.g. (1.0, 0, 0) is 100% red, no green, and no blue.

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. (1.0, 0, 0) is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. (1.0, 0, 0) is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. (0, 255, 0) is no red, 100% green, and no blue.

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - Fractions of each:
    e.g. (1.0, 0, 0) is 100% red, no green, and no blue.
  - 8-bit colors: numbers from 0 to 255:
    e.g. (0, 255, 0) is no red, 100% green, and no blue.
  - Hexcodes (base-16 numbers)...

Decimal & Hexadecimal Numbers

Counting with 10 digits:
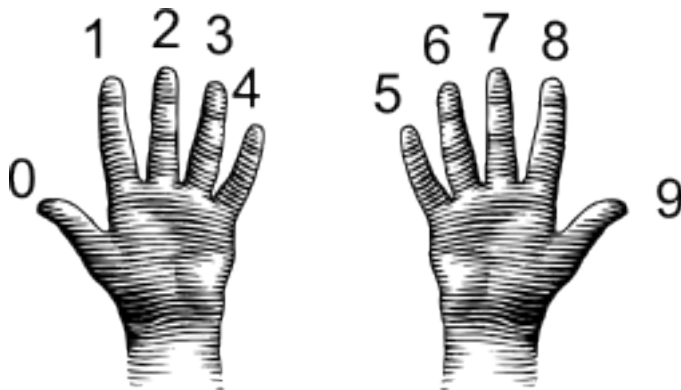
(from i-programmer.info)
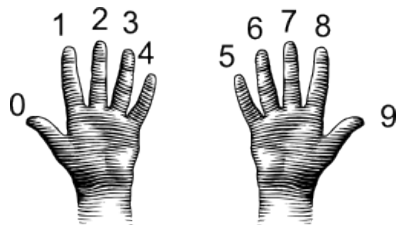
Decimal

(from i-programmer.info)
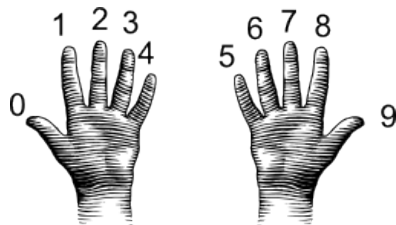
Decimal

(from i-programmer.info)

Decimal

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
```
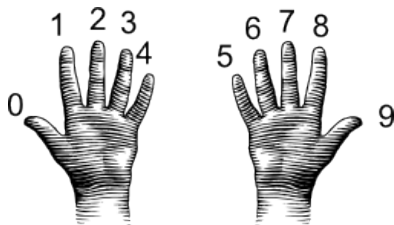

(from i-programmer.info)

Decimal

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
```


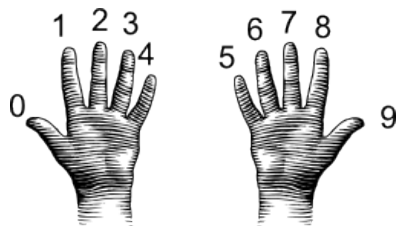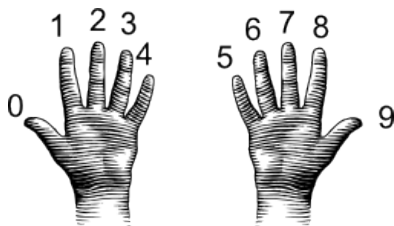
(from i-programmer.info)

Decimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
```

Decimal

(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49

Decimal

(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59

Decimal
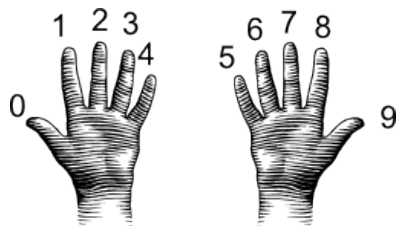
(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69

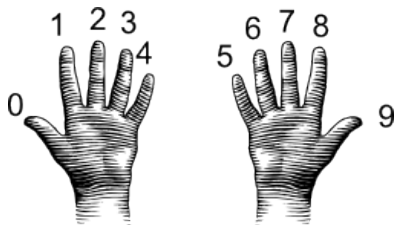# Decimal
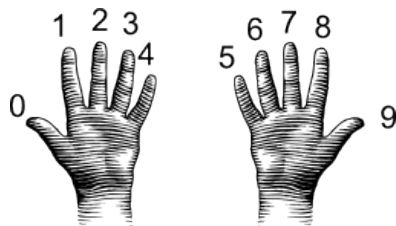
(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79
```

Decimal
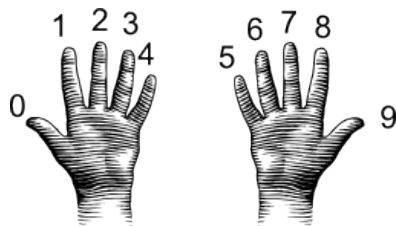
(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79
80 81 82 83 84 85 86 87 88 89
```

Decimal

(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Decimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79
80 81 82 83 84 85 86 87 88 89
90 91 92 93 94 95 96 97 98 99
```

$$10^1 + 10^0$$

Max Number = 99

Decimal

(from i-programmer.info)

00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

$$10^1 + 10^0$$

Max Number = 99

$$90 = (9 * 10^1) + (0 * 10^0)$$

Decimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79
80 81 82 83 84 85 86 87 88 89
90 91 92 93 94 95 96 97 98 99
```

$10^1 + 10^0$

Max Number = 99

$$90 = (9 * 10^1) + (0 * 10^0)$$

$$99 = (9 * 10^1) + (9 * 10^0)$$

Decimal & Hexadecimal Numbers

Counting with 16 digits:
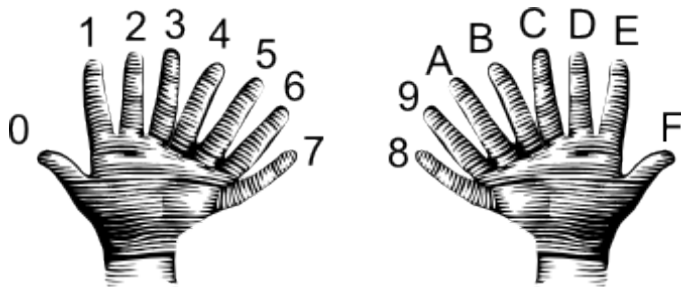
(from i-programmer.info)
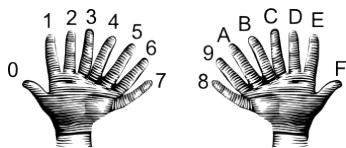
Hexadecimal

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```
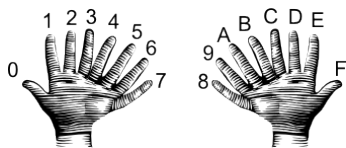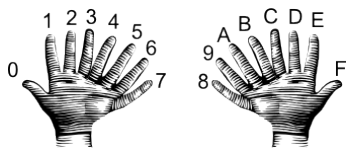

(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
```
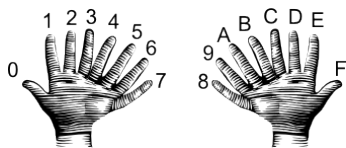

(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
```
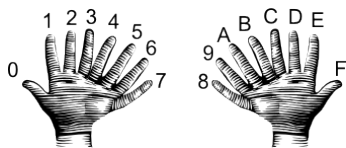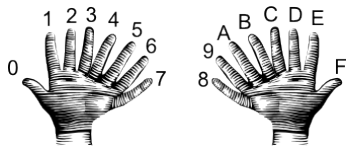

(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
```


(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
```
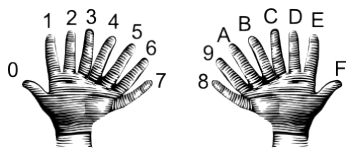

(from i-programmer.info)

Hexadecimal

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
```
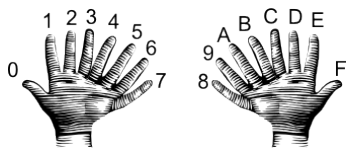

(from i-programmer.info)

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
```

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
```
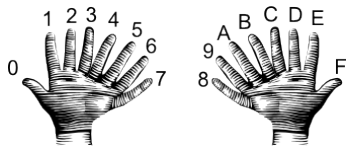
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
```
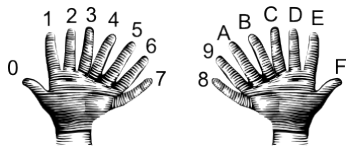
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
```
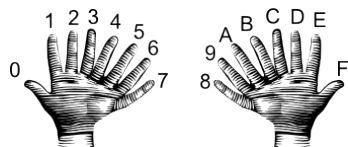
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
```
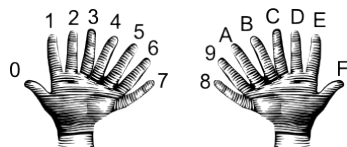
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
```
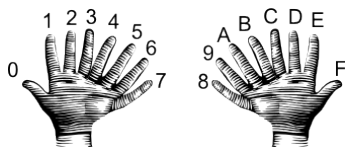
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
```
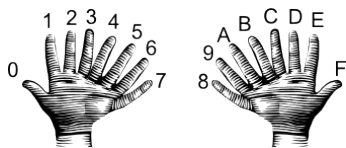
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
```
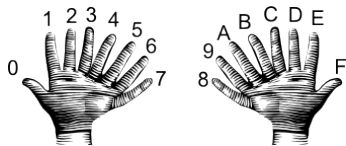
Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```
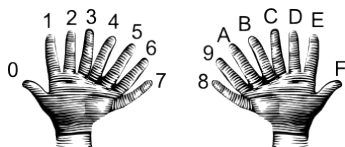
$$16^1 + 16^0$$

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```

$$16^1 + 16^0$$

Max Number = 255

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```

$16^1 + 16^0$

Max Number = 255

$F0 = (F * 16^1) + (0 * 16^0)$

$F0 = (240) + (0) = 240$

Hexadecimal

(from i-programmer.info)

```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
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F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
```

$$16^1 + 16^0$$

Max Number = 255

$$F0 = (F * 16^1) + (0 * 16^0)$$

$$F0 = (240) + (0) = 240$$

$$FF = (F * 16^1) + (F * 16^0)$$

$$FF = (240) + (15) = 255$$

Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
Blue	#0000FF	

- Can specify by numbers (RGB):
  - ▸ Fractions of each:
    e.g. (1.0, 0, 0) is 100% red, no green, and no blue.
  - ▸ 8-bit colors: numbers from 0 to 255:
    e.g. (0, 255, 0) is no red, 100% green, and no blue.
  - ▸ Hexcodes (base-16 numbers):

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  - Hexcodes (base-16 numbers):
    e.g. #0000FF is no red, no green, and 100% blue.

Challenge (Group Work):

Some review and some novel challenges:

```python
1  import turtle
2  teddy = turtle.Turtle()
3
4  names = ["violet", "purple", "indigo", "lavender"]
5  for c in names:
6    teddy.color(c)
7    teddy.left(60)
8    teddy.forward(40)
9    teddy.dot(10)
10
11  teddy.penup()
12  teddy.forward(100)
13  teddy.pendown()
14
15  hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
16  for c in hexNames:
17    teddy.color(c)
18    teddy.left(60)
19    teddy.forward(40)
20    teddy.dot(10)
```

Trinkets

```
1   import turtle
2   teddy = turtle.Turtle()
3
5 ▾ names = ["violet", "purple", "indigo", "lavender"]
5 ▾ for c in names:
6       teddy.color(c)
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10
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13  teddy.pendown()
14
15  hexNames = ["#FF00FF", "#990099", "#550055", "#111111"]
16 ▾ for c in hexNames:
17      teddy.color(c)
18      teddy.left(60)
19      teddy.forward(40)
20      teddy.dot(10)
```

(Demo with `trinkets`)

Recap

- In Python, we introduced:

Recap

- In Python, we introduced:
  - ▸ Indexing and Slicing Lists or Strings

Recap

- In Python, we introduced:
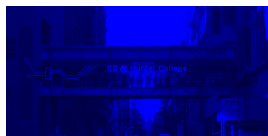   - ▶ Indexing and Slicing Lists or Strings
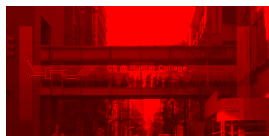   - ▶ Arithmetic

Recap

- In Python, we introduced:
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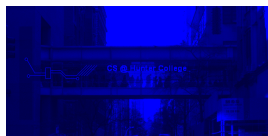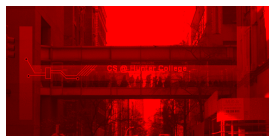 - ▸ Arithmetic
  - ▸ Colors

Recap

- In Python, we introduced:
  - Indexing and Slicing Lists or Strings
  - Arithmetic
  - Colors
  - Hexadecimal Notation

Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).

Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.
- Pull out something to write on (not to be turned in).
- Lightning rounds:
  - ▶ write as much you can for 60 seconds;
  - ▶ followed by answer; and
  - ▶ repeat.
- Past exams are on the webpage (under Final Exam Information).
- We're starting with Fall 2017, Version 2.

Weekly Reminders!

Before next lecture, don't forget to:
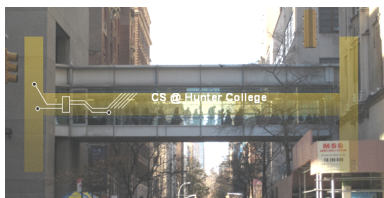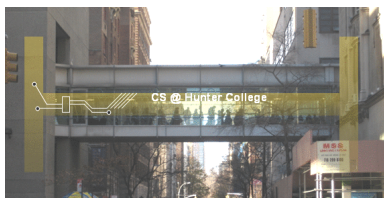
- Work on this week's Online Lab

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Before next lecture, don't forget to:

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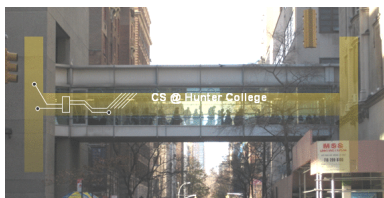
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- Submit this week's 5 programming assignments **(programs 11-15)**
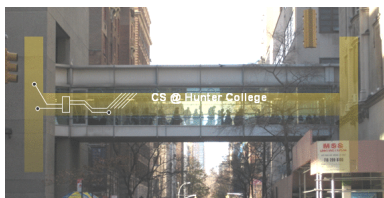
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Before next lecture, don't forget to:

- Work on this week's Online Lab
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- If you need help, schedule an appointment for Tutoring in lab 1001G 11:30am-5:30PM (the last appointment starts at 5:15PM)
- Take the Lecture Preview on Blackboard on Monday (or no later than 10:15am on Tuesday)

Lecture Slips & Writing Boards

CS @ Hunter College
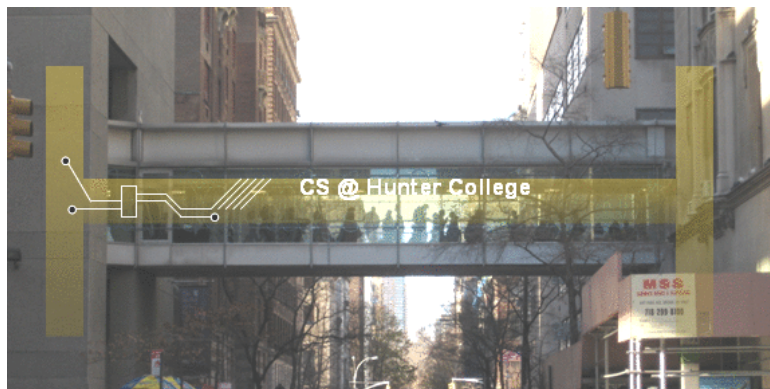
- Return writing boards as you leave.