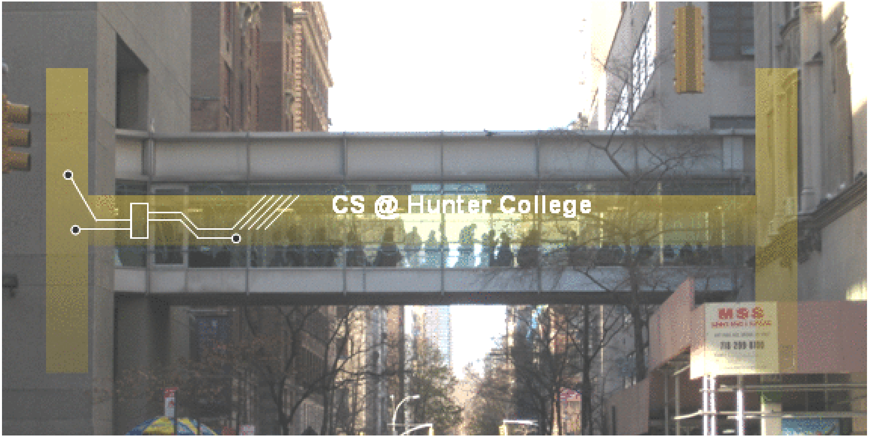
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

- This lecture will be recorded

Frequently Asked Questions

From email

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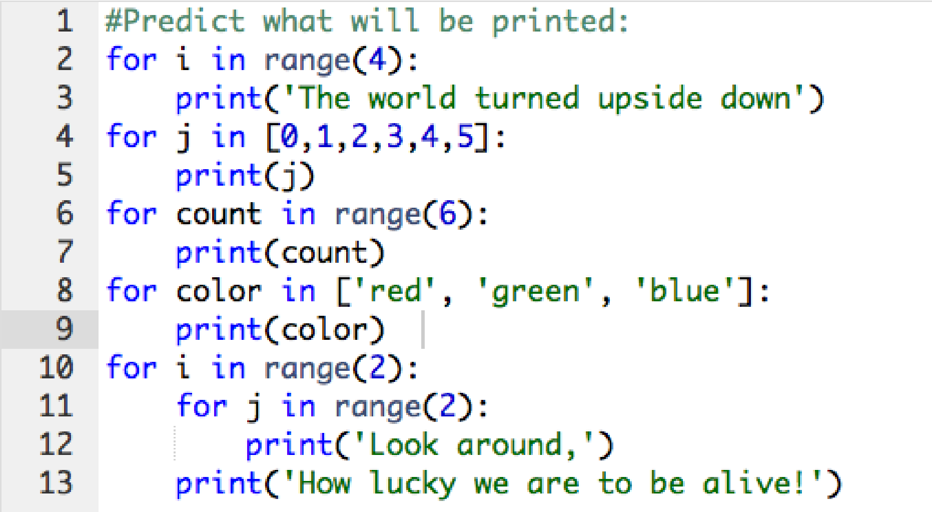
Today's Topics

- **For-loops**
- `range()`
- Variables
- Characters
- Strings
- Guest: Elise Harris (Advising, Clubs, Internships and more)

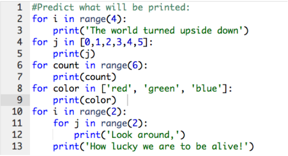
In Pairs or Triples...

Some review and some novel challenges:



```
#Predict what will be printed:
for i in range(4):
    print('The world turned upside down')
for j in [0,1,2,3,4,5]:
    print(j)
for count in range(6):
    print(count)
for color in ['red', 'green', 'blue']:
    print(color)
for i in range(2):
    for j in range(2):
        print('Look around,')
    print('How lucky we are to be alive!')
```

Python Tutor



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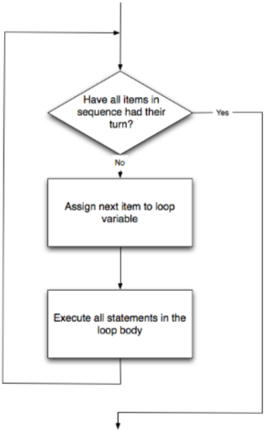
(Demo with `pythonTutor`)

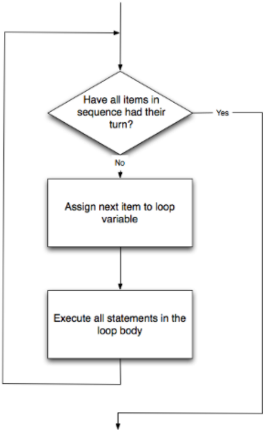
for-loop


Have all items in sequence had their turn?
Yes
No
Assign next item to loop variable
Execute all statements in the loop body

How to Think Like CS, §4.5

```
for  i in list:
     statement1
     statement2
     statement3
```

for-loop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where `list` is a list of items:

- stated explicitly (e.g. [1,2,3]) or
- generated by a function, e.g. `range()`.

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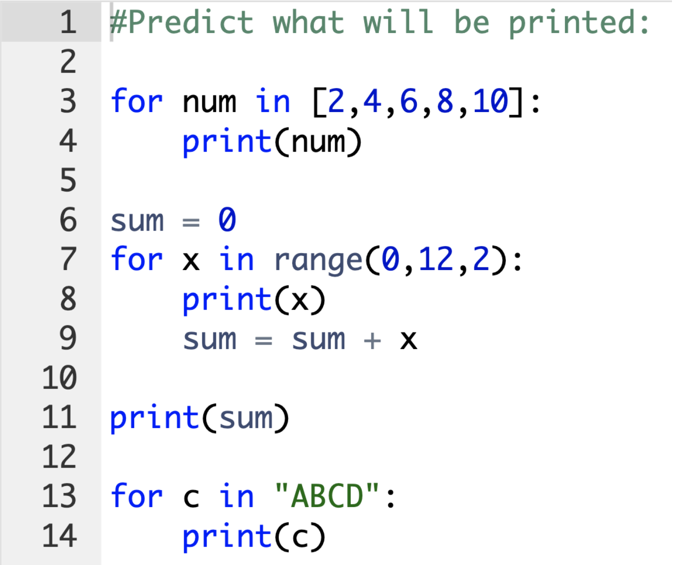
More on `range()`:



```python
#Predict what will be printed:

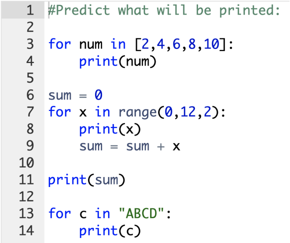
for num in [2,4,6,8,10]:
    print(num)

sum = 0
for x in range(0,12,2):
    print(x)
    sum = sum + x

print(sum)

for c in "ABCD":
    print(c)
```

Python Tutor



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`range()`

Simplest version:

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- For example, if you want the the list [0,1,2,3,...,100], you would write:

range()

Simplest version:

- range(stop)
- Produces a list: [0,1,2,3,...,stop-1]
- For example, if you want the the list [0,1,2,3,...,100], you would write:

```
range(101)
```

range()

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range()

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- `range(start, stop)`
- Produces a list:
  [start,start+1,...,stop-1]
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  [10,11,...,20]
  you would write:

  ```
  range(10,21)
  ```

range()

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- `range(start, stop, step)`
- Produces a list:
  [start,start+step,start+2*step...,last]
  (where last is the largest start+k*step less than stop)

range()

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- For example, if you want the the list
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range()

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  (where last is the largest start+k*step less than stop)
- For example, if you want the the list
  [5,10,...,50]
  you would write:

```
range(5,51,5)
```

In summary: range()

The three versions:

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- range(stop)

In summary: `range()`

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  - **string**: sequence of characters
  - **list**: a sequence of items e.g. `[3, 1, 4, 5, 9]` or `['violet','purple','indigo']`
  - **class variables**: for complex objects, like turtles.
- In Python (unlike other languages) you don't need to specify the type; it is deduced by its value.

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- Can use the underscore ('_'), upper and lower case letters.
- Can also use numbers, just can't start a name with a number.
- Can't use symbols (like '+' or '*') since used for arithmetic.
- Can't use some words that Python has reserved for itself (e.g. `for`).
  (List of reserved words in *Think CS*, §2.5.)

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Standardized Code for Characters

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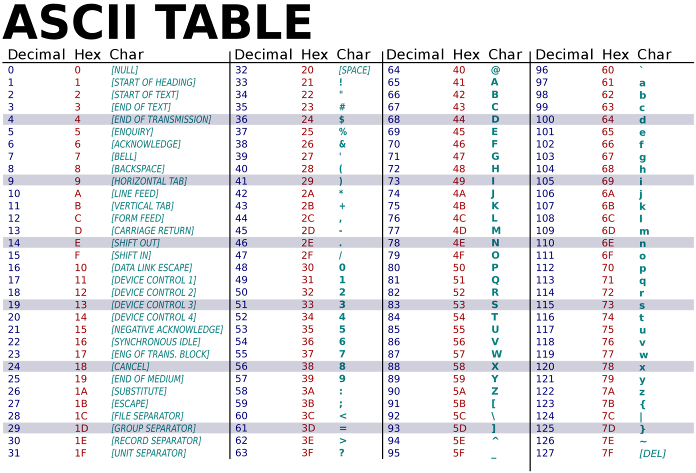


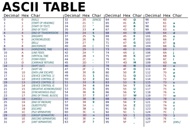
ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[ENG OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

(wiki)

Converting from Character to Code:

(There is an ASCII table on the back of today's lecture slip.)



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18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
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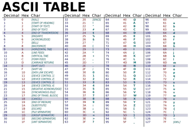

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15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
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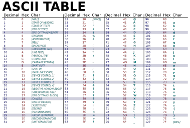

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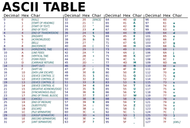

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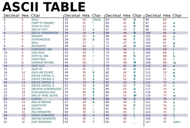

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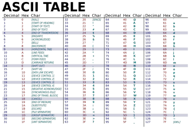

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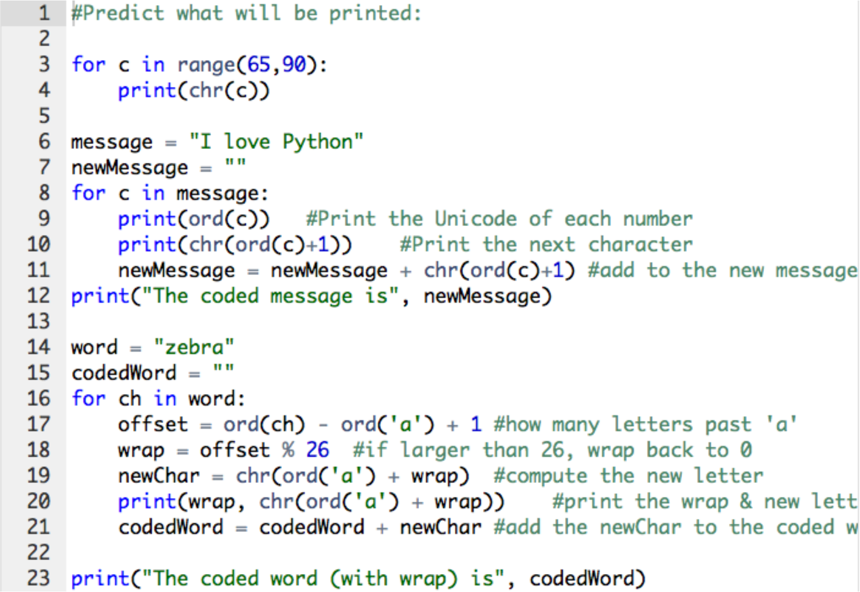
- What is `chr(33)`?

In Pairs or Triples...

Some review and some novel challenges:



```
#Predict what will be printed:

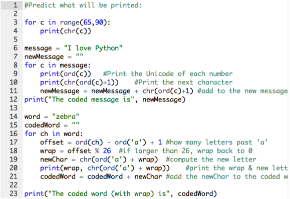
for c in range(65,90):
    print(chr(c))

message = "I love Python"
newMessage = ""
for c in message:
    print(ord(c))   #Print the Unicode of each number
    print(chr(ord(c)+1))    #Print the next character
    newMessage = newMessage + chr(ord(c)+1) #add to the new message
print("The coded message is", newMessage)

word = "zebra"
codedWord = ""
for ch in word:
    offset = ord(ch) - ord('a') + 1 #how many letters past 'a'
    wrap = offset % 26  #if larger than 26, wrap back to 0
    newChar = chr(ord('a') + wrap)  #compute the new letter
    print(wrap, chr(ord('a') + wrap))    #print the wrap & new lett
    codedWord = codedWord + newChar #add the newChar to the coded w

print("The coded word (with wrap) is", codedWord)
```

Python Tutor



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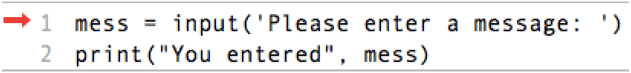
(Demo with `pythonTutor`)

User Input

Covered in detail in Lab 2:



```
mess = input('Please enter a message: ')
print("You entered", mess)
```

(Demo with `pythonTutor`)

Side Note: '+' for numbers and strings

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- `s = "hi" + "Mom"` stores `"hiMom"` in memory locations `s`.
- `s = s + "A"` adds the letter `"A"` to the end of the strings `s`.

Lecture Quiz

- Log-in to Gradescope
- Find LECTURE 2 Quiz
- Take the quiz
- **You have 3 minutes**

Today's Topics

- For-loops
- `range()`
- Variables
- Characters
- **Strings**
- Guest: Elise Harris (Advising, Clubs, Internships and more)

More on Strings: String Methods

```
s = "FridaysSaturdaysSundays"
num = s.count("s")
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  - What would `print(s.count("sS"))` output?
  - What about:

    ```
    mess = "10 20 21 9 101 35"
    mults = mess.count("0 ")
    print(mults)
    ```

More on Strings: Indexing & Substrings

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

- Strings are made up of individual characters (letters, numbers, etc.)

More on Strings: Indexing & Substrings

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More on Strings: Indexing & Substrings

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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

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F	r	i	d	a	y	s	S	a	...	S	u	n	d	a	y	s
												...	-4	-3	-2	-1

- `s[0]` is `’F’`.

More on Strings: Indexing & Substrings

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- `s[1]` is `’r’`.

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- s[-1] is

More on Strings: Indexing & Substrings

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- `s[-1]` is `'s'`.

More on Strings: Indexing & Substrings

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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[3:6]` is

More on Strings: Indexing & Substrings

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

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												...	-4	-3	-2	-1

- `s[:3]` is

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- `s[:3]` is `'Fri'`.

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- `s[:-1]` is

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

More on Strings: Splits

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

- `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

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"Friday~~s~~Saturday~~s~~Sunday"

More on Strings: Splits

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```
days = [’Friday’, ’Saturday’, ’Sunday’]
```

More on Strings: Splits

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- Different delimiters give different lists:

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- Different delimiters give different lists:

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

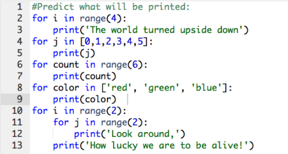
Today's Topics

- For-loops
- `range()`
- Variables
- Characters
- Strings
- **Guest: Elise Harris (Advising, Clubs, Internships and more)**

Guest Speaker: Elise Harris CS Opportunities

- Announcement on Blackboard:
    - Programs and Clubs Handout
    - Internships Handout
    - Hunter CS Handbook
    - PreTech Center (formerly CUNY2X) Newsletter

Recap



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#Predict what will be printed:
for i in range(4):
    print('The world turned upside down')
for j in [0,1,2,3,4,5]:
    print(j)
for count in range(6):
    print(count)
for color in ['red', 'green', 'blue']:
    print(color)
for i in range(2):
    for j in range(2):
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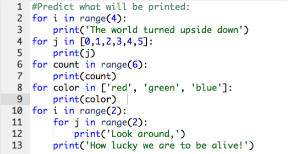
    print('How lucky we are to be alive!')
```

- In Python, we introduced:

Recap



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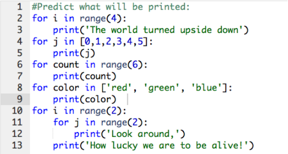
Recap



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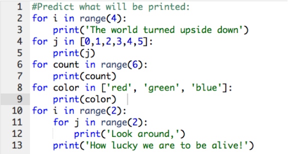
Recap



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- In Python, we introduced:
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  - Variables: ints and strings

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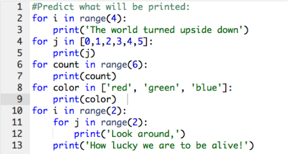

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  - Some arithmetic

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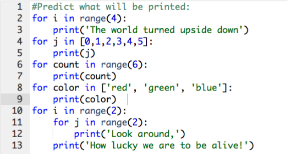

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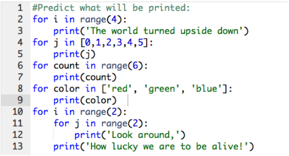
    - String concatenation

Recap



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- In Python, we introduced:
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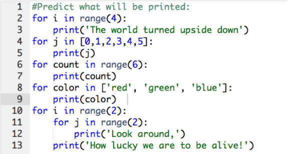
    - Functions: `ord()` and `chr()`

Recap



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- In Python, we introduced:
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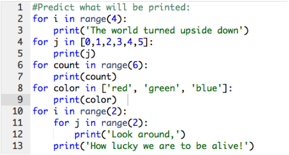

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Practice Quiz & Final Questions

- Since you must pass the final exam to pass the course, we end every lecture with final exam review.

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  - write as much you can for 60 seconds;
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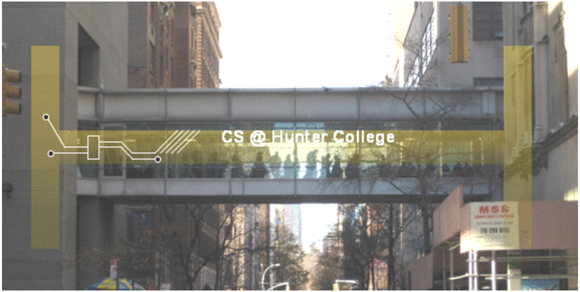
- Past exams are on the webpage (under Final Exam Information).
- We're starting with Spring 2018, Mock Exam.

See you next week!



Before next lecture, don't forget to:

- Work on this week's Online Lab
- Take the Lab Quiz on Gradescope by 6pm on Wednesday
- Submit this week's 5 programming assignments