Administrivia
- Homework #3 is due Friday Sep. 16.
- Midterm #1 will be Monday Oct. 3, covering through Lecture #11. (evening)
Warmup Quiz
a = 1
def fun(a,b):
    return a + b
a = fun( a,a ) + a

What is the final value of a?
A 2
B 3 *
C 4
a = 1
def fun(c,b):
    return c + b
a = fun( a,a ) + a
Question #2

\[ x = 10 \]
\[ \text{if } ((x/2) < 5) \text{ or } ((x\%3) == 1): \]
\[ x = x + 2 \]
\[ \text{if } (x != 10) \text{ or } ((x**2) <= 144): \]
\[ x = x * 2 \]

What is the final value of \( x \)?

A 10
B 12
C 20
D 24 ★
def fun(x):
    if x and x:
        return not x
    return x or x

x = fun(True) or fun(False)

What is the final value of x?
A True
B False ★
```python
def fun(a,b):
    if len(a)+len(b)>5:
        return (a+b)[0:5]
    return (b+a)+str(len(a))

x = fun("abc","def") + fun("gh","ij")
```

What is the final value of $x$?

A 'abcdefijgh4'
B 'defabcghij4'
C 'abcdeijgh'
D 'abcdeijgh4' ★
The following code should increment \( x \) if the hundreds place contains a zero:

```python
def fun(x):
    if x < 100 or ???:
        return x+1
    return x
```

What should replace the `???` to complete the code? Assume \( x \) is an integer.

A \( x.string(3) == '0' \)
B \( str(x)[-3] == '0' \) ★
C \( ((x//100) \% 10) == 0 \) ★
D None of the above.
Container Data Types
Example

colors = [ 'red', 'yellow', 'blue', 'jale', 'ulfire' ]
for color in colors:
    print( color.title() )
The list type represents an ordered collection of items.

- list is an iterable and a container.
- Containers hold values of any type (doesn’t have to be the same).
We create a list as follows:
- opening bracket [
- one or more comma-separated data values
- closing bracket ]
- lists work a bit like strings:
  
x = [ 10, 3.14, "Ride" ]

  print( x[1] )
  print( x[1:3] )
  print( len(x) )
But strings are immutable (we can’t change contents without creating a new string):

```python
s = "good advise"
s[9] = 'c'  # nope
s = s[:9] + 'c' + s[9:]  # this way
```
We can change list content—they are mutable.

```python
x = [4, 1, 2, 3]
x[3] = -2
x.append(5)
del x[1]
x.sort()
```

← item assignment
Loops
Loops

- We frequently need to process each value in a set of values.
- Two kinds: while and for
```python
number = 10
while number > 0:
    print(number)
    number = number - 1
print('Blast off!')
```
A while loop has only:
- the keyword while
- a logical comparison (bool-valued result)
- a block of code
The following code should increment $x$ if the hundreds place contains a zero:

```python
x = 3
while x > 0:
    print("Hello")
    x -= 1
```

How many times is 'Hello' printed?

A zero  
B once  
C twice  
D thrice  
E four times
String comparison methods

- These produce Boolean output.
  - `isdigit()` Does a string contain only numbers?
  - `isalpha()` Does a string contain only text?
  - `islower()` Does a string contain only lower-case letters?
  - `isupper()` Does a string contain only upper-case letters?
answer = input( 'How do you feel? ' )
if not answer.isalpha():
    print( "I don’t understand." )
else:
    print( "Ah, you feel %s." % answer )
Write a program for a user to create a new password. The program should accept a password attempt from the user and check it with the function `validate_password`. If the password is valid, the program ends. If the password is invalid, the program asks for a new attempt, repeating until the user enters a valid password.
pwd = input("Enter a password: ")
while not validate_password(pwd):
    pwd = input("INVALID! Try again: ")
print("Your password is valid.")
Make sure that your code always has a way to end!

```python
while True:
    print('Hello!')
```
Infinite loops

- Make sure that your code always has a way to end!
  ```python
  while True:
      print('Hello!')
  ```
- Use Ctrl+C to break free.
Design patterns are common structures we encounter in writing code.

The accumulator pattern uses an accumulator variable to track a result inside of a loop:

```python
i = 0
sum = 0
while i <= 4:
    sum += i
    i += 1
```
```
i = 0
sum = 0
while i <= 4:
    sum += i
    i += 1
```

What is the value of `sum`?

A 6
B 10
C 15
D None of the above.
i = 0
sum = 0
while i < 7:
    if (i % 2) == 1:
        sum += i
    i += 1

What is the value of sum?
A 9
B 12
C 16
D 21
Write a function to sum all of the digits in a number.

$12145 \rightarrow 1 + 2 + 1 + 4 + 5 \rightarrow 13$
def sum_digits( n ):
    s = str( n )
    i = 0
    result = 0
    while i < len( s ):
        result = result + int( s[i] )
        i = i + 1
    return result
Reminders
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