Representation

Announcements

Inheritance

Inheritance Example

A CheckingAccount is a specialized type of Account

```
>>> ch = CheckingAccount('Tom')
>>> ch.interest     # Lower interest rate for checking accounts
0.01
>>> ch.deposit(20)  # Deposits are the same
20
>>> ch.withdraw(5)  # Withdrawals incur a $1 fee
14
```

Most behavior is shared with the base class Account

```
class CheckingAccount(Account):
    """A bank account that charges for withdrawals."""
    withdraw_fee = 1
    interest = 0.01
    def withdraw(self, amount):
        return Account.withdraw(self, amount + self.withdraw_fee)
                                         or
        return super().withdraw(      amount + self.withdraw_fee)
```

Looking Up Attribute Names on Classes

Base class attributes *aren't* copied into subclasses!

To look up a name in a class:

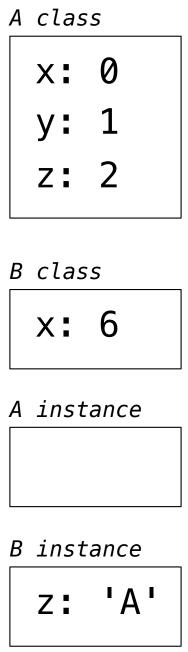
1. If it names an attribute in the class, return the attribute value.

2. Otherwise, look up the name in the base class, if there is one.

```
>>> ch = CheckingAccount('Tom')  # Calls Account.__init__
>>> ch.interest     # Found in CheckingAccount
0.01
>>> ch.deposit(20)  # Found in Account
20
>>> ch.withdraw(5)  # Found in CheckingAccount
14
```

Example: Three Attributes

```
class A:
    x, y, z = 0, 1, 2

    def f(self):
        return [self.x, self.y, self.z]

class B(A):
    """What would Python Do?

    >>> A().f()

    [0, 1, 2]

    >>> B).f()
     [6, 1, 'A']

    """
    x = 6
    def __init__(self):
        self.z = 'A'
```



String Representations

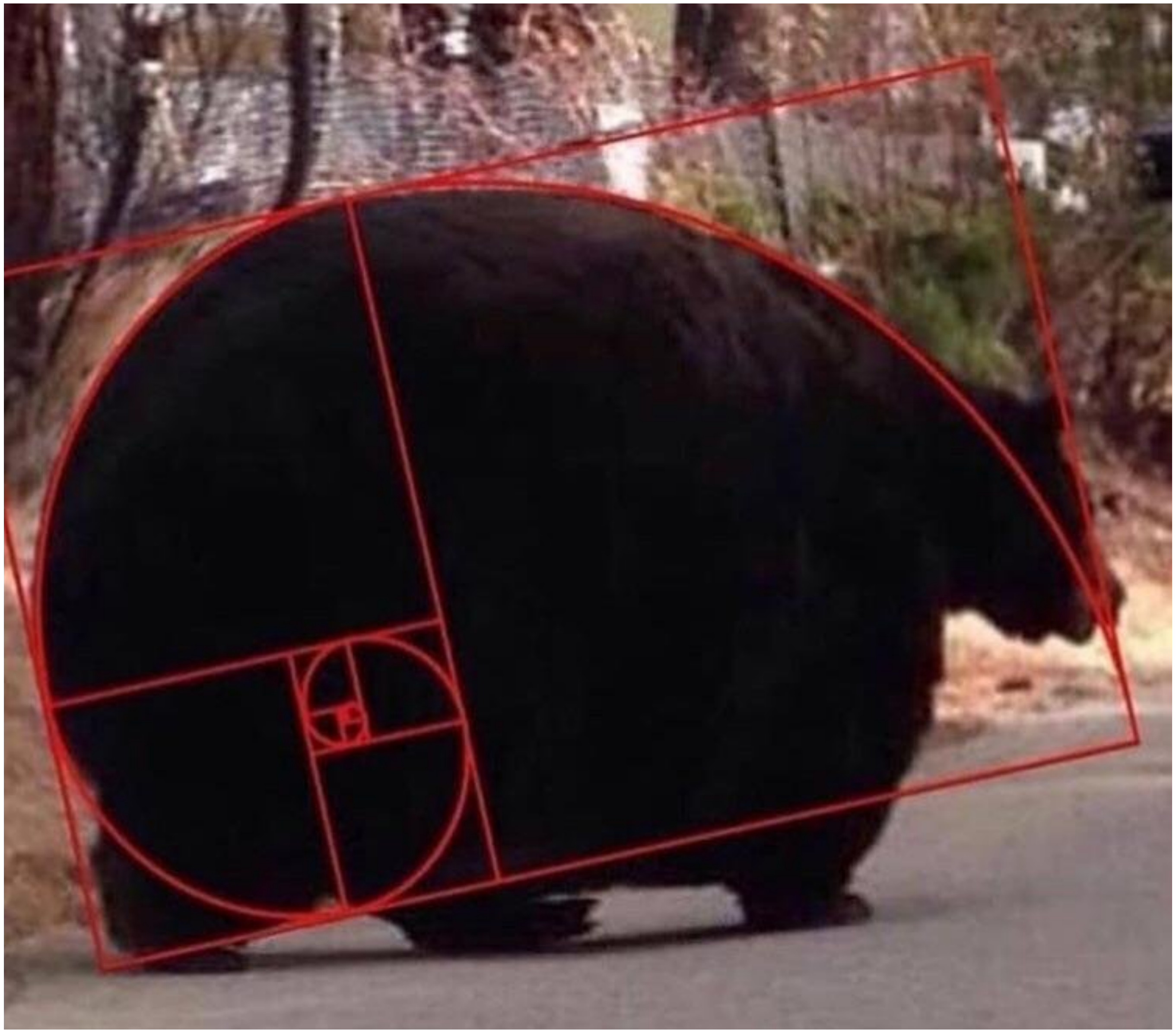
String Representations

In Python, all objects produce two string representations:

- The **str** is legible to humans
- The **repr** is legible to the Python interpreter

The **str** and **repr** strings are often the same, but not always

```
>>> from fractions import Fraction
>>> half = Fraction(1, 2)
>>> str(half)
'1/2'
>>> repr(half)
'Fraction(1, 2)'
```



Class Practice

Spring 2023 Midterm 2 Question 2(a)

```
class Letter:
    def __init__(self, contents):

        self.contents = contents

        self.sent = False


    def send(self):

        if self.sent:

            print(self, 'was already sent.')

        else:
            print(self, 'has been sent.')

            self.sent = True

            return Letter(self.contents.upper())

    def __repr__(self):
        return self.contents
```

Implement the **Letter** class. A **Letter** has two instance attributes: **contents** (a **str**) and **sent** (a **bool**). Each **Letter** can only be sent once. The **send** method prints whether the letter was sent, and if it was, returns the reply, which is a new **Letter** instance with the same contents, but in all caps.
Hint: 'hi'.upper() evaluates to 'HI'.

```
"""A letter receives an all-caps reply.

 >>> hi = Letter('Hello, World!')
 >>> hi.send()
 Hello, World! has been sent.
 HELLO, WORLD!
 >>> hi.send()
 Hello, World! was already sent.
 >>> Letter('Hey').send().send()
 Hey has been sent.
 HEY has been sent.
 HEY
 """
```

Spring 2023 Midterm 2 Question 2(b)

```
class Numbered(Letter):

    number = 0

    def __init__(self, contents):

        super().__init__(contents)

        self.number = Numbered.number
        ______________________________

        Numbered.number += 1
        ______________________________

    def __repr__(self):

        return '#' + str(self.number)
                     ___________________
```

Implement the **Numbered** class. A **Numbered** letter has a **number** attribute equal to how many numbered letters have previously been constructed. This **number** appears in its **repr** string. Assume **Letter** is implemented correctly.

```
"""A numbered letter has a different
repr method that shows its number.

>>> hey = Numbered('Hello, World!')
>>> hey.send()
#0 has been sent.
HELLO, WORLD!
>>> Numbered('Hi!').send()
#1 has been sent.
HI!
>>> hey
#0
"""
```