

Adding a Method to an Existing Class

```
In [1]: lst = []
```

```
In [2]: dir(lst)
```

```
Out[2]: ['__add__',
         '__class__',
         '__contains__',
         '__delattr__',
         '__delitem__',
         '__dir__',
         '__doc__',
         '__eq__',
         '__format__',
         '__ge__',
         '__getattr__',
         '__getitem__',
         '__gt__',
         '__hash__',
         '__iadd__',
         '__imul__',
         '__init__',
         '__init_subclass__',
         '__iter__',
         '__le__',
         '__len__',
         '__lt__',
         '__mul__',
         '__ne__',
         '__new__',
         '__reduce__',
         '__reduce_ex__',
         '__repr__',
         '__reversed__',
         '__rmul__',
         '__setattr__',
         '__setitem__',
         '__sizeof__',
         '__str__',
         '__subclasshook__',
         'append',
         'clear',
         'copy',
         'count',
         'extend',
         'index',
         'insert',
         'pop',
         'remove',
         'reverse',
         'sort']
```

```
In [3]: lst = list()
```

```
In [4]: lst.append(1)
lst
```

```
Out[4]: [1]
```

```
In [5]: list.append(lst, 1)
lst
```

```
Out[5]: [1, 1]
```

```
In [6]: class Point:
        'Class that represents a point in the plane'

        def setx(s, x_c):
            'Sets x coordinate of point to xcoord'
            s.x = x_c

        def sety(s, y_c):
            'Sets y coordinate of point to ycoord'
            s.y = y_c

        def get(s):
            'Returns coordinates of the point as a tuple'
            return (s.x, s.y)

        def move(s, dx, dy):
            'Changes the x and y coordinates by dx and dy'
            s.x += dx
            s.y += dy
```

```
In [7]: p1 = Point()
```

```
In [8]: p1.setx(1)
        # Point.setx(p1, 1)
```

```
In [9]: p1.sety(2)
        # Point.sety(p1, 2)
```

```
In [10]: p1.get()
         # Point.get(p1)
```

```
Out[10]: (1, 2)
```

```
In [11]: p1.move(10, 10)
         # Point.move(p1, 10, 10)
```

```
In [12]: p1.get()
         # Point.get(p1)
```

```
Out[12]: (11, 12)
```

```
In [13]: dir(Point)
```

```
Out[13]: ['__class__',
          '__delattr__',
          '__dict__',
          '__dir__',
          '__doc__',
          '__eq__',
          '__format__',
          '__ge__',
          '__getattr__',
          '__gt__',
          '__hash__',
          '__init__',
          '__init_subclass__',
          '__le__',
          '__lt__',
          '__module__',
          '__ne__',
          '__new__',
          '__reduce__',
          '__reduce_ex__',
          '__repr__',
          '__setattr__',
          '__sizeof__',
          '__str__',
          '__subclasshook__',
          '__weakref__',
          'get',
          'move',
          'setx',
          'sety']
```

```
In [14]: p2 = Point()
```

```
In [15]: p2.setx(2)
          # Point.setx(p2, 2)
```

```
In [16]: p2.sety(3)
          # Point.sety(p2, 3)
```

```
In [17]: p2.get()
```

```
Out[17]: (2, 3)
```

```
In [18]: p2.move(10, 10)
          # Point.move(p2, 10, 10)
```

```
In [19]: p1.get()
```

Out[19]: (11, 12)

In [20]: `dir(p1)`

Out[20]: ['__class__',
 '__delattr__',
 '__dict__',
 '__dir__',
 '__doc__',
 '__eq__',
 '__format__',
 '__ge__',
 '__getattr__',
 '__gt__',
 '__hash__',
 '__init__',
 '__init_subclass__',
 '__le__',
 '__lt__',
 '__module__',
 '__ne__',
 '__new__',
 '__reduce__',
 '__reduce_ex__',
 '__repr__',
 '__setattr__',
 '__sizeof__',
 '__str__',
 '__subclasshook__',
 '__weakref__',
 'get',
 'move',
 'setx',
 'sety',
 'x',
 'y']

In [21]: `p2.get()`

Out[21]: (12, 13)

In [22]: `dir(p2)`

Out[22]: ['__class__',
 '__delattr__',
 '__dict__',
 '__dir__',
 '__doc__',
 '__eq__',
 '__format__',
 '__ge__',
 '__getattr__',
 '__gt__',
 '__hash__',
 '__init__',
 '__init_subclass__',
 '__le__',
 '__lt__',
 '__module__',
 '__ne__',

```
'__new__',
'__reduce__',
'__reduce_ex__',
'__repr__',
'__setattr__',
'__sizeof__',
'__str__',
'__subclasshook__',
'__weakref__',
'get',
'move',
'setx',
'sety',
'x',
'y']
```

In []:

```
...
Add a new method getx() and gety() to class Point

>>> point = Point()
>>> point.setx(3)
>>> point.getx()
3
...
```

In [23]:

```
class Point:
    def setx(self, xcoord):
        self.x_c = xcoord
    def sety(self, ycoord):
        self.y_c = ycoord
    def get(self):
        return (self.x_c, self.y_c)
    def move(self, dx, dy):
        self.x_c += dx
        self.y_c += dy
    def getx(self):
        return self.x_c
    def gety(self):
        return self.y_c
```

In [24]:

```
point = Point()
point.setx(3)
point.getx()
```

Out[24]: 3

In [25]:

```
point.sety(2)
point.gety()
```

Out[25]: 2

In [26]:

```
dir(point)
```

Out[26]: ['__class__',
'__delattr__',

```
'__dict__',
'__dir__',
'__doc__',
'__eq__',
'__format__',
'__ge__',
'__getattr__',
'__gt__',
'__hash__',
'__init__',
'__init_subclass__',
'__le__',
'__lt__',
'__module__',
'__ne__',
'__new__',
'__reduce__',
'__reduce_ex__',
'__repr__',
'__setattr__',
'__sizeof__',
'__str__',
'__subclasshook__',
'__weakref__',
'get',
'getx',
'gety',
'move',
'setx',
'sety',
'x_c',
'y_c']
```

In [27]: `point.x_c`

Out[27]: 3

In [28]: `point.y_c`

Out[28]: 2

In [29]: `dir()`

Out[29]: ['In',
'Out',
'Point',
'_',
'_10',
'_12',
'_13',
'_17',
'_19',
'_2',
'_20',
'_21',
'_22',
'_24',
'_25',
'_26',
'_27',

```

'_28',
'_4',
'_5',
'__',
'__builtin__',
'__builtins__',
'__doc__',
'__loader__',
'__name__',
'__package__',
'__spec__',
'_dh',
'_i',
'_i1',
'_i10',
'_i11',
'_i12',
'_i13',
'_i14',
'_i15',
'_i16',
'_i17',
'_i18',
'_i19',
'_i2',
'_i20',
'_i21',
'_i22',
'_i23',
'_i24',
'_i25',
'_i26',
'_i27',
'_i28',
'_i29',
'_i3',
'_i4',
'_i5',
'_i6',
'_i7',
'_i8',
'_i9',
'_ih',
'_ii',
'_iii',
'_oh',
'exit',
'get_ipython',
'lst',
'p1',
'p2',
'point',
'quit']

```

In [30]: `dir(point)`

Out[30]: `['__class__', '__delattr__', '__dict__', '__dir__', '__doc__', '__eq__', '__format__',`

```
'__ge__',
'__getattr__',
'__gt__',
'__hash__',
'__init__',
'__init_subclass__',
'__le__',
'__lt__',
'__module__',
'__ne__',
'__new__',
'__reduce__',
'__reduce_ex__',
'__repr__',
'__setattr__',
'__sizeof__',
'__str__',
'__subclasshook__',
'__weakref__',
'get',
'getx',
'gety',
'move',
'setx',
'sety',
'x_c',
'y_c']
```

```
In [31]: point_1 = Point()
point_1.setx(100)
point_1.sety(200)
point_1.get()
```

Out[31]: (100, 200)

```
In [32]: point_1.getx()
```

Out[32]: 100

```
In [33]: point_1.gety()
```

Out[33]: 200

```
In [34]: point_1.x_c
```

Out[34]: 100

```
In [35]: point_1.y_c
```

Out[35]: 200

```
In [36]: dir()
```



```
Out[36]: ['In',
          'Out',
          'Point',
          '_',
          '_10',
          '_12',
          '_13',
          '_17',
          '_19',
          '_2',
          '_20',
          '_21',
          '_22',
          '_24',
          '_25',
          '_26',
          '_27',
          '_28',
          '_29',
          '_30',
          '_31',
          '_32',
          '_33',
          '_34',
          '_35',
          '_4',
          '_5',
          '_',
          '_',
          '__builtin__',
          '__builtins__',
          '__doc__',
          '__loader__',
          '__name__',
          '__package__',
          '__spec__',
          '_dh',
          '_i',
          '_i1',
          '_i10',
          '_i11',
          '_i12',
          '_i13',
          '_i14',
          '_i15',
          '_i16',
          '_i17',
          '_i18',
          '_i19',
          '_i2',
          '_i20',
          '_i21',
          '_i22',
          '_i23',
          '_i24',
          '_i25',
          '_i26',
          '_i27',
          '_i28',
          '_i29',
          '_i3',
          '_i30',
          '_i31',
          '_i32',
          '_i33',
```

```
'_i34',
'_i35',
'_i36',
'_i4',
'_i5',
'_i6',
'_i7',
'_i8',
'_i9',
'_ih',
'_ii',
'_iii',
'_oh',
'exit',
'get_ipython',
'lst',
'p1',
'p2',
'point',
'point_1',
'quit']
```

```
In [37]: dir(point)
```

```
Out[37]: ['__class__',
 '__delattr__',
 '__dict__',
 '__dir__',
 '__doc__',
 '__eq__',
 '__format__',
 '__ge__',
 '__getattribute__',
 '__gt__',
 '__hash__',
 '__init__',
 '__init_subclass__',
 '__le__',
 '__lt__',
 '__module__',
 '__ne__',
 '__new__',
 '__reduce__',
 '__reduce_ex__',
 '__repr__',
 '__setattr__',
 '__sizeof__',
 '__str__',
 '__subclasshook__',
 '__weakref__',
 'get',
 'getx',
 'gety',
 'move',
 'setx',
 'sety',
 'x_c',
 'y_c']
```

```
In [38]: dir(point_1)
```

```
Out[38]: ['__class__',
          '__delattr__',
          '__dict__',
          '__dir__',
          '__doc__',
          '__eq__',
          '__format__',
          '__ge__',
          '__getattr__',
          '__gt__',
          '__hash__',
          '__init__',
          '__init_subclass__',
          '__le__',
          '__lt__',
          '__module__',
          '__ne__',
          '__new__',
          '__reduce__',
          '__reduce_ex__',
          '__repr__',
          '__setattr__',
          '__sizeof__',
          '__str__',
          '__subclasshook__',
          '__weakref__',
          'get',
          'getx',
          'gety',
          'move',
          'setx',
          'sety',
          'x_c',
          'y_c']
```

Develop a New Class 'Animal'

```
In [ ]: ...
        Develop class "Animal" that supports the following methods:
        setSpecies(species)
        setLanguage(language)
        speak()

        >>> snoopy = Animal()
        >>> snoopy.setSpecies('dog')
        >>> snoopy.setLanguage('bark')
        >>> snoopy.speak()
        I am a(an) dog and I bark.
        ...
```

```
In [39]: class Animal:
          def setSpecies(self, sp):
              self.spec = sp
          def setLanguage(self, lg):
              self.lang = lg
          def speak(self):
              print('I am a(an) {} and I {}'.format(self.spec, self.lang))
```

```
In [40]: snoopy = Animal()
```

```
In [41]: snoopy.setSpecies('dog')
```

```
In [42]: snoopy.setLanguage('bark')
```

```
In [43]: snoopy.speak()
```

I am a(an) dog and I bark.

```
In [44]: dir()
```

```
Out[44]: ['Animal',  
          'In',  
          'Out',  
          'Point',  
          '_',  
          '_10',  
          '_12',  
          '_13',  
          '_17',  
          '_19',  
          '_2',  
          '_20',  
          '_21',  
          '_22',  
          '_24',  
          '_25',  
          '_26',  
          '_27',  
          '_28',  
          '_29',  
          '_30',  
          '_31',  
          '_32',  
          '_33',  
          '_34',  
          '_35',  
          '_36',  
          '_37',  
          '_38',  
          '_4',  
          '_5',  
          '_',  
          '__',  
          '__builtin__',  
          '__builtins__',  
          '__doc__',  
          '__loader__',  
          '__name__',  
          '__package__',  
          '__spec__',  
          '_dh',  
          '_i',  
          '_i1',  
          '_i10',  
          '_i11',
```

```
'_i12',
'_i13',
'_i14',
'_i15',
'_i16',
'_i17',
'_i18',
'_i19',
'_i2',
'_i20',
'_i21',
'_i22',
'_i23',
'_i24',
'_i25',
'_i26',
'_i27',
'_i28',
'_i29',
'_i3',
'_i30',
'_i31',
'_i32',
'_i33',
'_i34',
'_i35',
'_i36',
'_i37',
'_i38',
'_i39',
'_i4',
'_i40',
'_i41',
'_i42',
'_i43',
'_i44',
'_i5',
'_i6',
'_i7',
'_i8',
'_i9',
'_ih',
'_ii',
'_iii',
'_oh',
'exit',
'get_ipython',
'lst',
'p1',
'p2',
'point',
'point_1',
'quit',
'snoopy']
```

```
In [45]: dir(snoopy)
```

```
Out[45]: ['__class__',
           '__delattr__',
           '__dict__',
           '__dir__',
           '__doc__',
           '__eq__',
           '__format__',
```

```
'__ge__',
'__getattr__',
'__gt__',
'__hash__',
'__init__',
'__init_subclass__',
'__le__',
'__lt__',
'__module__',
'__ne__',
'__new__',
'__reduce__',
'__reduce_ex__',
'__repr__',
'__setattr__',
'__sizeof__',
'__str__',
'__subclasshook__',
'__weakref__',
'lang',
'setLanguage',
'setSpecies',
'speak',
'spec']
```

In [46]: `snoopy.spec`

Out[46]: `'dog'`

In [47]: `snoopy.lang`

Out[47]: `'bark'`

In [48]: `hellokitty = Animal()`

In [49]: `hellokitty.setSpecies('cat')`

In [50]: `hellokitty.setLanguage('meow')`

In [51]: `hellokitty.speak()`

I am a(an) cat and I meow.

In [52]: `snoopy_2 = Animal()`
`snoopy_2.setSpecies('dog')`

In [53]: `snoopy_2.speak()`

```
-----
AttributeError                                Traceback (most recent call last)
<ipython-input-53-b9d215030636> in <module>
----> 1 snoopy_2.speak()
```

```

<ipython-input-39-5901e5738baa> in speak(self)
      5         self.lang = lg
      6     def speak(self):
----> 7         print('I am a(an) {} and I {}'.format(self.spec, self.lang))

```

AttributeError: 'Animal' object has no attribute 'lang'

```
In [54]: dir(snoopy_2)
```

```

Out[54]: ['__class__',
          '__delattr__',
          '__dict__',
          '__dir__',
          '__doc__',
          '__eq__',
          '__format__',
          '__ge__',
          '__getattribute__',
          '__gt__',
          '__hash__',
          '__init__',
          '__init_subclass__',
          '__le__',
          '__lt__',
          '__module__',
          '__ne__',
          '__new__',
          '__reduce__',
          '__reduce_ex__',
          '__repr__',
          '__setattr__',
          '__sizeof__',
          '__str__',
          '__subclasshook__',
          '__weakref__',
          'setLanguage',
          'setSpecies',
          'speak',
          'spec']

```

Overloading Constructor

```
In [55]: lst = [1, 2, 3]
         lst
```

```
Out[55]: [1, 2, 3]
```

```
In [56]: lst_1 = list()
         lst_1.append(1)
         lst_1.append(2)
         lst_1.append(3)
         lst
```

```
Out[56]: [1, 2, 3]
```

```
In [57]: class Point:
        def __init__(self, xcoord = 0, ycoord = 0):
            self.x = xcoord
            self.y = ycoord
        def setx(self, xcoord):
            self.x = xcoord
        def sety(self, ycoord):
            self.y = ycoord
        def get(self):
            return (self.x, self.y)
```

```
In [58]: p = Point(10, 20)
        p.get()
```

Out[58]: (10, 20)

```
In [59]: p_1 = Point(100, 200)
        p_1.get()
```

Out[59]: (100, 200)

```
In [60]: p_2 = Point()
        p_2.get()
```

Out[60]: (0, 0)

```
In [61]: lst1 = []
```

```
In [62]: lst2 = [1, 2, 3]
```

```
In [ ]: ...
        Modify the class Animal so it supports a two, one, or no input argument constructor.

        >>> snoopy = Animal('dog', 'bark')
        >>> snoopy.speak()
        I am a(an) dog and I bark.
        >>> tweety = Animal('canary')
        >>> tweety.speak()
        I am a(an) canary and I make sounds.
        >>> animal = Animal()
        >>> animal.speak()
        I am a(an) animal and I make sounds.
        ...

        ...
        class Animal:
            def setSpecies(self, sp):
                self.spec = sp
            def setLanguage(self, lg):
                self.lang = lg
```



```
def speak(self):
    print('I am a(an) {} and I {}'.format(self.spec, self.lang))
...
```

```
In [63]: class Animal:
def __init__(self, sp, lg):
    self.spec = sp
    self.lang = lg
def setSpecies(self, sp):
    self.spec = sp
def setLanguage(self, lg):
    self.lang = lg
def speak(self):
    print('I am a(an) {} and I {}'.format(self.spec, self.lang))
```

```
In [64]: snoopy = Animal('dog', 'bark')
```

```
In [65]: snoopy.speak()
```

I am a(an) dog and I bark.

```
In [ ]: snoopy = Animal()
```

```
In [67]: class Animal:
def __init__(self, sp = 'animal', lg = 'make sounds'):
    self.spec = sp
    self.lang = lg
def setSpecies(self, sp):
    self.spec = sp
def setLanguage(self, lg):
    self.lang = lg
def speak(self):
    print('I am a(an) {} and I {}'.format(self.spec, self.lang))
```

```
In [68]: snoopy = Animal('dog', 'bark')
```

```
In [69]: snoopy.speak()
```

I am a(an) dog and I bark.

```
In [70]: snoopy = Animal('dog')
```

```
In [71]: snoopy.speak()
```

I am a(an) dog and I make sounds.

```
In [72]: snoopy = Animal()
```

In [73]:

```
snoopy.speak()
```

I am a(an) animal and I make sounds.