Week 5 - Classes

Exercise 1 - Classes in Python

Question 1.

In [21]:
```
class Item():
    def __init__(self):
        print('This is an item')

Apple = Item()
```

```
This is an item
```

Question 2 and 3.

In [22]:
```
class Item():
    def __init__(self, Description, Number, UnitPrice):
        self.Description = Description
        self.Number = Number
        self.UnitPrice = UnitPrice
        print('Created a new item: ', self.Description)
```

Question 4.

In [23]:
```
Apple = Item('Apple', 1, 0.5)
print(Apple.Description, Apple.Number, Apple.UnitPrice)
```

```
Created a new item:  Apple
Apple 1 0.5
```

Question 5.

In [24]:
```
class Item():
    def __init__(self, Description, Number, UnitPrice):
        self.Description = Description
        self.Number = Number
        self.UnitPrice = UnitPrice
        print('Created a new item: ', self.Description)

    def PrintItemInfo(self):
        print('Item description:', self.Description)
        print('Item number:', self.Number)
        print('Item unit price:', self.UnitPrice)

Apple = Item('Apple', 1, 0.5)
Apple.PrintItemInfo()
```

```
Created a new item:  Apple
Item description: Apple
Item number: 1
Item unit price: 0.5
```

Question 6.

In [26]:
```
class Item():
    def __init__(self, Description, Number, UnitPrice):
        self.Description = Description
        self.Number = Number
        self.UnitPrice = UnitPrice
        print('Created a new item:', self.Description)

    def PrintItemInfo(self):
        print('Item description:', self.Description)
        print('Item number:', self.Number)
        print('Item unit price:', self.UnitPrice)

    def __str__(self):
        return self.Description

# now to create the shopping list:
Apple = Item('Apple', 1, 0.5)
Orange = Item('Orange', 4, 1)
Coffee = Item('Coffee', 1, 5)

ShoppingList = [Apple, Orange, Coffee]

for l in ShoppingList:
    print(l)
```

```
Created a new item: Apple
Created a new item: Orange
Created a new item: Coffee
Apple
Orange
Coffee
```

Question

In [27]:
```
total_price = 0
for l in ShoppingList:
    l.PrintItemInfo()
    total_price = l.Number * l.UnitPrice

print('The total price is:', total_price)
```

```
Item description: Apple
Item number: 1
Item unit price: 0.5
Item description: Orange
Item number: 4
Item unit price: 1
Item description: Coffee
Item number: 1
Item unit price: 5
The total price is: 5
```

Exercise 2 - Vectors

Question

In [4]:
```
from math import *

sqrt(100)
```

Out[4]:
```
10.0
```

Question

In [8]:
```
class Vector():
    def __init__(self, x, y, z):
        self.x = x
        self.y = y
        self.z = z

    def norm(self):
        return sqrt(self.x**2 + self.y**2 + self.z**2)

    def __str__(self):
        return '<'+ str(self.x) + ',' + str(self.y) + ',' + str(self.z) + '>'

    def __add__(self, other):
        return Vector(self.x + other.x, self.y + other.y, self.z + other.z)

    def __mul__(self, other):
        if type(other) == float:
            return Vector(self.x * other, self.y * other, self.z * other)
        elif type(other == Vector):
            return self.x * other.x + self.y * other.y + self.z * other.z

    def __rmul__(self, other):
        if type(other) == float:
            return self * other


v = Vector(1, 3, 2)
print(v)

w = Vector(5, 0, 1)

print(v + w)

theta = acos(v * w / v.norm() / w.norm())
print(f'theta = {theta:.2f} radians')

print(v * 2.0)
```

```
<1,3,2>
<6,3,3>
theta = 1.20 radians
<2.0,6.0,4.0>
```

Question

Exercise 3 - Inheritance

Question 1.

In [31]:
```
class SpecialItem(Item):
    def __init__(self, Description, Number, UnitPrice, SpecialInfo):
        super.__init__(Description, Number, UnitPrice)
        self.SpecialInfo = SpecialInfo
```

Question 2 and 3.

In [44]:
```
class SpecialItem(Item):
    def __init__(self, Description, Number, UnitPrice, SpecialInfo):
        super().__init__(Description, Number, UnitPrice)
        self.SpecialInfo = SpecialInfo

    def __str__(self):
        return self.Description + ': ' + self.SpecialInfo

    def PrintItemInfo(self):
        print('Item description:', self.Description)
        print('Item number:', self.Number)
        print('Item unit price:', self.UnitPrice)
        print('Special info:', self.SpecialInfo)
```

Question 4.

In [48]:
```
Paracetamol = SpecialItem('Paracetamol', 1, 0.5, 'Take two tablets every six hour

print(Paracetamol)
print('------')

Paracetamol.PrintItemInfo()
print('------')

Apple.PrintItemInfo()
```

```
Created a new item: Paracetamol
Paracetamol: Take two tablets every six hours
------
Item description: Paracetamol
Item number: 1
Item unit price: 0.5
Special info: Take two tablets every six hours
------
Item description: Apple
Item number: 1
Item unit price: 0.5
```

In [ ]:

Question

In [ ]:

Question

In [ ]:

Question

In [ ]:

Question

In [ ]:

Question

In [ ]: