

# Informatics for Astronomers - WS2021

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## Exercise sheet 7 - Python classes

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*The following will be also part of the assessment:*

*(1) Try to present exercises in a way that everyone can understand (even those who didn't do the exercises), so please explain the vital parts of your solution in a clear way.*

*(2) Try to also include some background information where applicable, and/or explain the possible context/motivation for the given exercise.*

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1. Consider a `class` that represents a circumference.

```
class Circle:
    def __init__(self, radius):
        self.radius = radius
```

Besides radius, a circumference should have attached the following properties/attributes that are derived from the radius:

- perimeter
- area

Please implement them and show how they work. There are a few ways to do it.

2. During the tutorial, functions to calculate the distance between vectors and the dot ( $\cdot$ ) and the cross ( $\times$ ) were implemented. Please transform these functions into class methods of a new class `Vector` so we can perform the following operations as:

```
list1 = [-2.4, 0.1, 5.3]
list2 = [4.7, -3.0, 1.7]

v1 = Vector(list1)
v2 = Vector(list2)
value1 = v1.distance(v2) # a float
value2 = v1.dot(v2)      # another float
v3 = v1.cross(v2)        # another Vector check with
isinstance(v3, Vector)
> True
```

3. Please create (with an editor) a simple webpage that includes some pictures, text and links to your favorite website.
  - Open the webpage with your browser and show us the source.

- Now go to <http://www.google.com> and show us the source code.

Opinions?

4. The Sloan Digital Sky Survey has produced catalogs of millions of objects on the sky. These catalogs are stored in **SQL** databases and are easily accessible through their webpages.

For example, <http://skyserver.sdss.org/dr15/en/tools/search/radial.aspx> allows to search of objects within a certain distance from the central position. In reality that web page execute a **SQL** command, which is also shown along the results of the query.

Using the **SQL** form <http://skyserver.sdss.org/dr15/en/tools/search/sql.aspx> is possible to execute arbitrary queries. Copy the previous command here and execute it again. Play a bit with the parameters.

- What is the advantage of the “pure” **SQL** form in comparison with the radial form used at the beginning?
- What do you think about the **SQL** syntax?
- Is possible to access **SQL** databases with **python**?