

DSC 430: Python Programming  
Assignment 1001: Planet

Which planet is closest to the Earth? The answer might surprise you. In the first part of this assignment, you will create a Planet class. The class should take a **radius** and a **year**. For example...

```
>> mercury = Planet(3.5,88)
```

For simplicity, we will assume the orbits are perfect circles, are all on the same plane and are whole days. The orbital radius and year length for each planet are given below:

Planet	CM*	Days
Mercury	3.5	88
Venus	6.7	225
Earth	9.3	365
Mars	14.2	687
Jupiter	48.4	4333
Saturn	88.9	10759
Uranus	179	30687
Neptune	288	60190
* 1 CM = 1 million miles		

The planet class should have a function, `position()`, that returns the position of the planet on a specific day. For example...

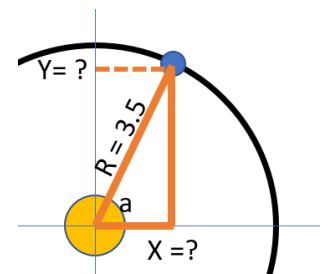
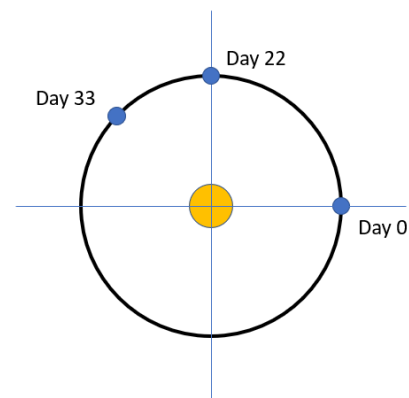
```
>> mercury.position(0)
>> 3.5, 0
```

On day 0, Mercury's position is at its starting position:  $x = 3.5$  CM,  $y = 0$  CM relative to the Sun at 0, 0. Likewise...

```
>> mercury.position(22)
>> 0, 3.5
>> mercury.position(33)
>> -2.47, 2.47
>> mercury.position(440)
>> 3.5, 0
```

Notice that, for a planet, the radius is always the same. Moreover, given a specific day and the length of a year for the planet, you can compute angle a in this diagram. Thus, with the hypotenuse and a, you should be able to calculate  $x$  and  $y$ . Recall “**sohcahtoa**” from high school.

[https://mathworld.wolfram.com/SOHCAHTOA.html#:~:text=%22SOHCAHTOA%22%20is%20a%20helpful%20mnemonic,\(1\)](https://mathworld.wolfram.com/SOHCAHTOA.html#:~:text=%22SOHCAHTOA%22%20is%20a%20helpful%20mnemonic,(1))



Finally, create a function that takes two planet objects and a day. It should return the distance between the planets on that day.

```
>> d = distance(earth, mars, 732)
```

Ensure to provide a sufficient amount of documentation/comments in the code. Also write answers to these in a comment section at the end of the code file. Specifically, answer the following questions:

- What is the distance between Earth and Mars on day 732?
- How does your `position()` function work? What trigonometry functions did you need to use?
- How does your `distance()` function work? Show that you employed top-down design in its implementation.

**Submission:** Submit the source file (.ipynb) and the exported html file (.html) to the D2L. Do not zip or archive the file. Your code must include comments at the top including your name, assignment number, and the honor statement, "I have not given or received any unauthorized assistance on this assignment." Also, each function must include a docstring.