

Lab Assignment 7

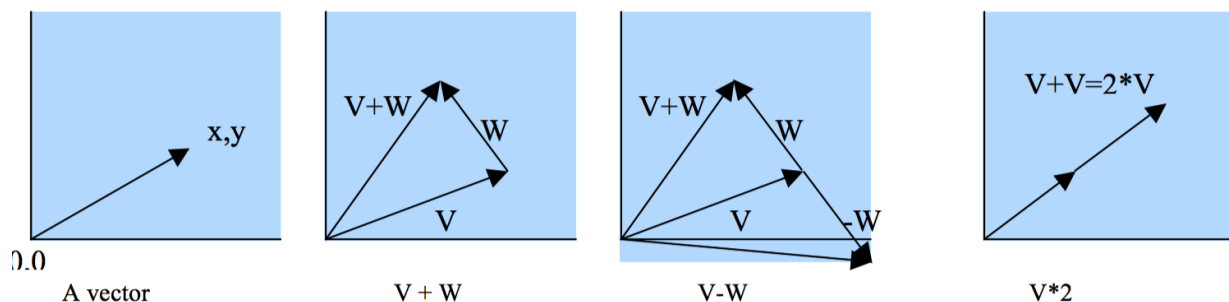
Classes

Assignment Overview

We are going to experiment with overloaded operators and making our own class. We are going to make a 2D vector class.

Background

So if you don't remember, here is a little background on two-dimensional vectors. A vector is basically an arrow that has a magnitude (a length) and a direction (an angle with respect to typically the x axis). It usually is represented as an x,y pair, where the origin of the vector is a $0,0$ and the head of the vector is at the listed pair.



Here are some of the operations you can perform on a vector:

- Vector addition: If V_1 is (x,y) and V_2 is (a,b) , the $V+W$ is $(x+a,y+b)$, a vector.
- Vector multiplication by a scalar: If V_1 is (x,y) , the $V*n$ is $(x*n,y*n)$ a vector.
- Vector subtraction: $V-W$ is the same as $V+(W*-1)$ a vector.
- Vector multiplication with another vector: There are two possibilities, dot product or cross product. We'll do dot product. If $V=(x,y)$ and $W=(a,b)$, then $V*W = x*a + y*b$, a scalar. Thus the dot product yields a scalar, not a vector.
- Vector magnitude: The magnitude based on the Pythagorean theorem for a $V=(x,y)$ says that the magnitude is $\sqrt{x^2 + y^2}$. You might look at `math.hypot` for this.

Assignment Description / Specification:

Make a vector class. Provide the operators

```
__init__    # constructor, takes 3 args: self,x,y . No return
__str__     # for printing, takes 1 arg self. Returns a string
__add__     # vector + vector. Takes 2 args, self and vector. Returns a new #vector
__sub__     # vector - vector. Takes 2 args, self and vector. Returns a new #vector
```

`__mul__` # two possibilities. `vector*integer` or `vector*vector` (dot #product). Get it to do just one of # the two at first, then see if #you can use introspection to do both

`magnitude` # magnitude of the vector. One arg, `self`. Returns a float

Deliverables

1. Submit your `lab07.py` through svn – your source code solution (remember to include your name, section as comments in this file).
2. Also submit a txt file in Blackboard.