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Vector Addition Calculator Project

Code - https://github.com/Hectonight/CompSci/blob/main/VectorAddition.py

Steps to completing the code:

1. Import the math library.

```
import math
```

2. Create dictionaries to store information.

```
vecA = {
  'magnitude': float(input('Input the magnitude of Vector A: ')),
  'user_angle': float(input('Input the angle of Vector A in degrees: ')),
  'direct_angle': [input(f'Input the direction of Vector A (N, S, E, W):
').upper()]
}
if vecA['user_angle'] != 0:
  if vecA['direct_angle'][0] in ['N', 'S']:
      vecA['direct_angle'].append(input('of (E, W): ').upper())
  else:
      vecA['direct_angle'].append(input('of (N, S): ').upper())

vecB = {
  'magnitude': float(input('Input the magnitude of Vector B: ')),
  'user_angle': float(input('Input the angle of Vector B in degrees: ')),
  'direct_angle': [input('Input the direction of Vector B (N, S, E, W):
').upper()]

}
```

3. Take user input for the magnitudes and angles of the vectors (including direction of angle).

4. Convert the magnitude and angle to floats.

5. Using the direction angle and angle the user inputted, find the actual angle.

6. Convert the angles to radians.

7. Find the x value of vectors A and B by doing rcos(θ) and the y value by doing rsin(θ).

```
vec['x'] = vec['magnitude'] * (math.cos(math.radians(vec['angle'])))
vec['y'] = vec['magnitude'] * (math.sin(math.radians(vec['angle'])))
```

8. Find the x and y length of Vector C (the answer) by adding together the lengths of x and y for vectors B and C.

```
vecC = {'x': vecA['x'] + vecB['x'], 'y': vecA['y'] + vecB['y']}
```

9. Find the magnitude of Vector C by squaring the length of the vector's x and y coordinates, adding them together, and then taking the square root from them and round it to the nearest tenth.

```
vecC['magnitude'] = round(math.sqrt((vecC['x']**2) + (vecC['y']**2)), 1)
```

10. Find the angle of Vector C by using the inverse tangent of y over x, convert it back to degrees, and round it to the nearest tenth.

```
vecC['angle'] = round(math.degrees(math.atan(vecC['y']/vecC['x'])), 1)
```

11. If the angle of Vector C is equal to 0 and the x component of the vector is below 0 then set the angle of Vector C to 180.

```
if vecC['angle'] == 0 and vecC['x'] < 0:
  vecC['angle'] = 180
```

12. Repeat adding 180 to Vector C's angle while Vector C's angle is less than 180 and the component of the vector is less than 0.

```
while 180 > vecC['angle'] and vecC['y'] < 0:
  vecC['angle'] += 180
```

13. Convert Vector C's angle to a directional angle

14. Print the result

```
print('{} units at {}'.format(vecC['magnitude'], final_angle))
```