Problem

1. Write a pure Python function that computes $V(n)$:

   For $n \geq 1$:

$$V(n) = \sum_{k=0}^{n-1} U(k)$$

$$U(n) = [\log(\sin(n) + V(n))]^4$$

   For $n = 0$:

$$V(0) = 42$$

   You can use: `from math import sin, log`

2. Time this function for $n = 20$.

3. Profile the running time.

4. Use a memoization method to speed up the calculation. Is it faster?

5. Write a `numpy` version of this function. You can use:

```
from numpy import sin as sin_, log as log_, sum as sum_
```

   Is it faster?