DATA 200 Spring 2020 Homework 1

Due February 8, 2020 at 10:00am

1. Write a Python program that counts and returns the number of "A" and "T" as well as the percentage of "A" & "T" characters in a given character string. Here's an example of the output:

```
Given string: "ACTGATCGATTACGTATAGTATTTGCTATCATACATATATATCGATGCGTTCAT"
length: 54
A count: 16
T count: 21
Percentage of A & T:  0.6851851851851852
```

(10 points)

2. The p-norm of a vector $v = (v_1, v_2, \ldots, v_n)$ in n-dimensional space is defined as

$$\|v\| = \sqrt[p]{v_1^p + v_2^p + \cdots + v_n^p}$$

For the special case of $p = 2$, this results in the traditional *Euclidean norm*, which represents the length of the vector. For example, the Euclidean norm of a two-dimensional vector with coordinates (4, 3) has a Euclidean norm of $\sqrt{4^2 + 3^2} = \sqrt{25} = 5$. Write a Python function `norm(v, p)` which returns the *p*-norm value of *v* and `norm(v)` returns the Euclidean norm of *v* (i.e. `norm` has a default parameter $p = 2$). Assume that *v* is a list of numbers.

(10 points)