MATLAB Programming NYCU Fall 2024 Assignment#4 due 2024/11/28

This assignment extends the previous lab on class **Vec3**. The main objectives include more functionalities and the capabilities of the methods to handle object arrays. Below are the tasks to be implemented in this assignment:

- The constructor: It should accept the following types of inputs:
  - No input argument (as a default constructor): A scalar **Vec3** that is **(0,0,0)** is created.
  - Three input arguments (numerical arrays of identical size) for the **x**, **y**, and **z** elements. The output is a **Vec3** array.
- The **norm** function should return a **double** array of the same size as the input **Vec3** array.
- The **iszero** function. It takes a **Vec3** array as input, and outputs a logical array indicating whether the corresponding elements are zero-length vectors.
- The **normalize** function. It takes a **Vec3** array as input, and outputs a **Vec3** array of corresponding unit vectors. For input elements that are zero-length vectors, the corresponding output elements should be **(NaN,NaN,NaN)**.
- The **disp** function: Show the object in the form ***(x,y,z)***. You should handle the display of 2-D **Vec3** arrays.
- For the following functions, the inputs could be (1) two **Vec3** arrays of the same size, or (2) one **Vec3** array and one **Vec3** scalar.
  - The **inner_prod** function. It takes two inputs of class **Vec3** and return their inner products as a **double** array.
  - Operator overloading functions: **plus** and **minus**, which does addition and subtraction of two **Vec3** arrays, respectively. The output is a **Vec3** array.
  - Operator overloading function: **eq**, which checks whether two **Vec3** arrays are equal elementwise. The output is a logical array.

The following is a sequence of operations using the **Vec3** class.

```
>> a = Vec3
a =
(0,0,0)
>> b = a + Vec3(3,2,1)
b =
(3,2,1)
>> c = [a b; b b+b]
c =
(0,0,0)         (3,2,1)
(3,2,1)         (6,4,2)
>> d = Vec3(0,1,2)
d =
(0,1,2)
>> iszero(c)
ans =
  2×2 logical array
   1   0
   0   0
>> inner_prod(c, b)
ans =
     0    14
    14    28
>> inner_prod(b, c)
ans =
     0    14
    14    28
>> inner_prod(c, c)
ans =
     0    14
    14    56
>> e = normalize(c - d)
e =
(0,-0.447214,-0.894427)(0.904534,0.301511,-0.301511)
(0.904534,0.301511,-0.301511)(0.894427,0.447214,0)
>> norm(e)
ans =
    1.0000    1.0000
    1.0000    1.0000
```

Submission: Submit your **Vec3.m** files through E3. (Since this is a class file, the file name is the same as the class name.) There will be a three-day grace period after the due date, during which there will be a 10%/day deduction for your grade.

Your code should include sufficient comments. This will be part of the grade. Include your name and ID at the top of your code.

There will be demo session with the TAs (date/time to be announced later).