

## OOP Assignment 2

Due: 11:59 p.m., 15 March 2016

Problem. The code of [2016-0309](#) computes inner product of two vectors. It also contains some unit tests. In this assignment, you will build on this result to add one more computation: summing two vectors. Further, you will add unit tests to test the new function. Here are a few examples in the case of computing the sum of two vectors,

$$[1, 0] + [1, 1] = [2, 1],$$

$$[1, 1, 0] + [0, 1, 1] = [1, 2, 1], \text{ and}$$

$$[1, 0] + [1, 1, 0] \Rightarrow \text{undefined}.$$

Further, after you write up the function for computing sum of vectors, write a test to **verify** the following theorem of vector computation:

***Let  $u$ ,  $v$ , and  $w$  be vectors of the same dimensions. Then,***

$$\mathbf{u} \cdot (\mathbf{v} + \mathbf{w}) = \mathbf{u} \cdot \mathbf{v} + \mathbf{u} \cdot \mathbf{w}$$

Please complete the following list of tasks to solve the problem:

T1. Compute sum (normal and exceptional). Name the function like this:

**`double * const sum(double * const u, double * const v, int d1, int d2);`**

T2. Test the sum (normal) by adding unit tests.

T3. Test the sum (exceptional) by adding unit tests.

T4. Test to verify that  $\mathbf{u} \cdot (\mathbf{v} + \mathbf{w}) = \mathbf{u} \cdot \mathbf{v} + \mathbf{u} \cdot \mathbf{w}$ , where  $\mathbf{u}$ ,  $\mathbf{v}$ , and  $\mathbf{w}$  are three vectors of the same dimension.