

Name: Solutions

1. (4 points) Consider the vector $t = (t_1, t_2, t_3, t_4, t_5)$. Write down the entries of the following vectors. In each case your answer should be of the form $v = (\cdot, \dots, \cdot)$ where you have explicitly filled in the entries of the vector v .

- $v = t + 3\mathbf{1}_5$

$$(t_1 + 3, t_2 + 3, t_3 + 3, t_4 + 3, t_5 + 3)$$

- $v = t_{2:5} - t_{1:4}$

$$(t_2 - t_1, t_3 - t_2, t_4 - t_3, t_5 - t_4)$$

- $v = (\mathbf{1}_3, t)$

$$(1, 1, 1, t_1, t_2, t_3, t_4, t_5)$$

2. Consider an 6-dimensional vector x . Express each of the following operations on x in terms of an inner product $c^T x$ by exhibiting the vector c . In each case your answer should be of the form $c = (\cdot, \dots, \cdot)$ where the six entries of c are explicit numbers.

- The last entry of x minus first entry of x .

$$c = (1, 0, 0, 0, 0, -1)$$

- The sum of the first three entries of x minus the sum of the last three entries of x .

$$c = (1, 1, 1, -1, -1, -1)$$

- The sum of the following two numbers:

- The average of the first four entries of x , **and**
- the average of the last two entries of x .

$$c = \left(\frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{2}, \frac{1}{2} \right)$$