

→ directions

1. (6 points) Let $\alpha = 3$, $u = (1, 2, 3)$ and $v = (2, 0, -1)$. Calculate each expression below. (Suppose $\mathbf{1}$ is a 3-vector of all 1's.)

(a) $u + \mathbf{1}$

$$\begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$$

(b) $\mathbf{1}^T u$

$$1+2+3=6$$

(c) $(\alpha u)^T v$.

$$\begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}^T \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = 6+0-9 = -3$$

2. (2 points) Suppose a course is graded based on five chapter tests and one final exam, each out of 100 points. The total course score in the class, s , is calculated as weighted average where the chapter tests are worth 60% of the grade and the final exam score is worth the remaining 40% of the grade. The record for each student is given by a 6-vector r where r_1, r_2, r_3, r_4 , and r_5 are the chapter test scores and r_6 is the final exam score.

Find a vector w such that the s in the form $s = w^T r$ and s is a number from 0 to 100.

$$\frac{60\%}{5} = 12\%, \quad w = (0.12, 0.12, 0.12, 0.12, 0.12, 0.4)$$

1 2 3 4 5 6

3. (2 points) Let $x = (x_1, x_2, x_3, x_4, x_5)$ be a 5-vector.

(a) Find the vector $d = x_{2:5} - x_{1:4}$. (Note that your answer will have x_i 's in it.)

$$d = \begin{bmatrix} x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} - \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} x_2 - x_1 \\ x_3 - x_2 \\ x_4 - x_3 \\ x_5 - x_4 \end{bmatrix}$$

- (b) Suppose that x gives the price of a particular stock, in dollars per share, at the end of each day for the previous week (ie Mon - Fri). What does the vector d represent for this stock? (One or two sentences is sufficient.)

d gives the difference in price between consecutive days. So if $x_2 - x_1$ is negative, the stock lost value between end of business Monday to end of business on Tuesday.