

Answer on Question #34412 – Math – Matrix | Tensor Analysis

Mr. X went to market to purchase 3 kg of sugar, 10 kg of wheat and 1kg of salt. In a shop, ARPICO near to Mr. X's residence, these commodities are priced at Rs 20, Rs10 and Rs 8 per kg whereas in the local market, CARGILLS these commodities are priced at Rs 15, Rs. 8 and Rs 6 per kg respectively. If the cost of traveling to CARGILLS is Rs 25, find the net savings of Mr. X, using matrix multiplication method.

Solution

Denote by C_1 and C_2 vectors of prices in ARPICO and CARGILLS respectively. Then

$$C_1 = \begin{pmatrix} 20 \\ 10 \\ 8 \end{pmatrix}; C_2 = \begin{pmatrix} 15 \\ 8 \\ 6 \end{pmatrix}$$

Let Q denotes vector of amounts needed for Mr. X. Then

$$Q = \begin{pmatrix} 3 \\ 10 \\ 1 \end{pmatrix}$$

Then the total price he pays equals to

$$Q' C_i$$

Thus the difference between total prices in 2 shops equals to

$$Q' C_1 - Q' C_2 = Q' (C_1 - C_2)$$

Calculation:

$$Q' (C_1 - C_2) = (3 \ 10 \ 1) \left[\begin{pmatrix} 20 \\ 10 \\ 8 \end{pmatrix} - \begin{pmatrix} 15 \\ 8 \\ 6 \end{pmatrix} \right] = (3 \ 10 \ 1) \begin{pmatrix} 5 \\ 2 \\ 2 \end{pmatrix} = 15 + 20 + 2 = 37$$

Since travelling to CARGILLS costs Rs 25 net savings equals to

$$37 - 25 = 12$$

ANSWER: Rs 12