

Math 1119B, Tutorial 2

Monday, October 3, 2011

1. Let $\begin{bmatrix} 1 & -2 & -1 & 3 & 0 \\ -2 & 4 & 5 & -8 & 3 \\ 3 & -6 & -6 & 11 & -3 \end{bmatrix}$ be the augmented matrix of a system of linear equations. Find the solution to the system.

2. Dreaming Tree vineyard has two varieties of wine, a cabernet sauvignon and a chardonnay. The cabernet retails for \$30 and the chardonnay retails for \$25. Each bottle of cabernet costs \$2.50 in labor, \$5 in overhead and \$5 in materials, where the chardonnay costs \$2.50 in labor, \$4 in overhead and \$4 in materials.

i) Create two vectors giving itemized costs, per sales dollar, of the two bottles.

ii) Suppose the vineyard wants to sell \$14 worth of cabernet sauvignon, and \$14 worth of chardonnay. give a vector outlining their total costs.

iii) The vineyard wants to sell a gift box worth \$52, and they want to make 25% profit. Furthermore, they want to split their costs 20/30/50. Give the augmented matrix of a system that solves how much wine (in dollars) they should include (solving the system is good practice, but may take a long time with a lot of fractions).

3. Let $A = \begin{bmatrix} 1 & -2 & -1 & 3 & 0 \\ -2 & 4 & 5 & -8 & 3 \\ 3 & -6 & -6 & 11 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 0 & 4 \\ 2 & 6 \\ -1 & -3 \\ -4 & 0 \end{bmatrix}$ and $C = (1/4)B$.

Calculate $(AC)^T$ i) directly, ii) using the OC-transpose theorem.

4. Let $v_1 = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$, $v_2 = \begin{bmatrix} -2 \\ 0 \\ 3 \end{bmatrix}$, $v_3 = \begin{bmatrix} 4 \\ 12 \\ -3 \end{bmatrix}$. Denote by A the matrix with v_1, v_2 and v_3 as columns of A .

i) If $x = [x_1 \ x_2 \ x_3]^T$, calculate Ax .

ii) Let $b = [11 \ 3 \ -1]^T$. Solve the system $Ax = b$.