

Applications Review Matrices

- 1.) A store owner can buy a second hand vending machine for \$120. If a bottle of pop can be bought for \$.65 and sold for \$.95, how many bottles must be sold to recover the costs incurred? Note; this is called the break-even point (where expenses exactly equals income). It is used to help businesses estimate the amount of a product that must be sold before a profit can be made
- 2.) The local electric company's current rate schedule is \$8.50 equipment charge and \$.09 per Kwh of electricity used. Next year the company plans to charge a base fee of \$6.00 and a \$.10 per Kwh electricity charge. For what Kwh use-age will a home-owner's bill be the same for both years?
- 3.) A farmer has 1200 hectares planted in potatoes, grain and corn. When the crops are planted, each hectare of potatoes requires 3 hours to plant, grain requires 1 hour and corn requires 2 hours for each hectare. Labour costs \$12 per hour. Seed costs are \$10 per hectare for potatoes, \$15 per hectare for grain and \$5 per hectare for corn. The farmer has planned to spend \$24,000 on labour and \$13,000 on seed. How many hectares of each crop can be planted?
- 4.) Using what you know about matrix coding and decoding, encode the following messages using the encoding matrix:

$$A = \begin{bmatrix} 4 & -2 \\ 3 & -2 \end{bmatrix}$$

1. THIS MAN CANNOT BE TRUSTED
2. YOU ARE BEING FOLLOWED
3. MEET ME AT THE WHITE HOUSE
4. THIS PHONE IS NOT SECURE

Using what you know about encoding and decoding matrices, DECODE the following using the original encoding matrix (a 0 will correspond to a space):

$$A = \begin{bmatrix} 4 & -2 \\ 3 & -2 \end{bmatrix}$$

Message 1 104 -56 93 -56 27 -18 76 -38 91 -48 66 -42 80 -50 0 0

Message 2 77 -46 92 -46 15 -8 56 -28 107 -56 69 -46 78 -46 0 0