Math 1310 Assignment 1

[10] 1. Anne goes to the supermarket and purchases 1 pound of apples and 2 pounds of bananas for which she pays \$2.37. Later that day Betty goes to the same supermarket and purchases 1 pound of bananas and 2 pounds of grapes for which she pays \$4.57. Still later that day Carol goes to the same supermarket and purchases 2 pounds of apples, 3 pounds of bananas and 1 pound of grapes for which she pays \$6.14. Assuming there was no change of price for the fruit during the day; find the price per pound for the apples, the bananas and the grapes.

[5] 2. The Munchy Dog Food Company has fixed costs from salaries and building operations of \$1500 per day. It produces dog biscuits which it sells for \$5 a box. If the cost to produce a box of dog biscuits is \$2.50, find the following.

(a) The cost **C** to produce x boxes of dog biscuits per day.

(b) The revenue **R** obtained from selling x boxes of dog biscuits.

(c) The break-even point.

[10] 3. Tammy sells hand-crafted bead necklaces at craft fair. The rental cost for a booth is \$50 and her cost of material to produce one necklace is \$2.50. She sells the necklaces for \$5.00 each.

(a) Find the linear cost function for Tammy to set up and sell x necklaces at the craft fair.

(b) Find the revenue function for the sale of x necklaces.

(c) How many necklaces must Tammy produce and sell to break even?

(d) How many necklaces must she produce and sell to make a profit of \$75.00?

(e) Draw the graphs of the cost function C and the revenue function R on the same diagram and label the break-even point on the diagram.

[10] 4. Consider the line l whose equation is $x + 5y = 10$.

(a) Find an equation of the l_1 that passes through $(-3,5)$ and is parallel to l.

(b) Find an equation of the line l_2 that passes through $(-3,5)$ and is perpendicular to line l.

(c) Find the intersection of the line l_2 with the line passing through points $(1, 1)$ and $(2, -3)$.

[5] 5. Find all 1 by 3 row reduced echelon form (RREF) matrices.

[10] 6. Determine which of the following matrices are in RREF. For the matrices that are not in RREF perform the necessary row operations to reduce them to RREF.

$$\mathrm{M} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix},\ \mathrm{N} = \begin{bmatrix} 0 & 2 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix},\ \mathrm{P} = \begin{bmatrix} 1 & 2 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix},\ \mathrm{Q} = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix},\ \mathrm{S} = \begin{bmatrix} 1 & 3 & -1 \\ 0 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$$

[5] 7. Use the Gaussian elimination method with back substitution to solve the following system of linear equations.

$$\begin{aligned} x + y + z + w &= 5 \\ 2x + 3y + 2z + 3w &= 7 \\ 3x + 4y + 3z + 5w &= 10 \end{aligned}$$

[5] 8. Use the Gauss-Jordan elimination procedure to solve the following system.

$$\begin{aligned} x - y + 2z &= 3 \\ -x + y - 2z - w &= 0 \\ 2x - y + 2z + w &= -1 \end{aligned}$$