Math 1310 Assignment 1

[5] 1. The Manitoba Museum of Man and Nature sells adult tickets for $18 each and children's tickets for $12 each. On a particular Saturday 350 tickets were sold and the total revenue was $5100. How many tickets of each type were sold?

[10] 2. Jane's change purse contains pennies, dimes and quarters. The total value of the coins is $1.37 and the number of pennies is less than 10.
(a) Find all possible solutions for the number of pennies, dimes and quarters in Jane's change purse.
(b) How many of the solutions have more pennies than dimes?
(c) Is there a solution consisting of exactly 10 coins?
(d) Is there a solution consisting of exactly 11 coins?

[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. Let l be the line having the equation $4x + 5y = 20$.
(a) Sketch the graph of the line l.
(b) Find an equation for the line l_1 that passes through the point (2,3) and is perpendicular to the given line l.
(c) Find an equation of the line l_2 that passes through the point (1,3) and is parallel to the given line l.
(d) Find the coordinates of the point of intersection of the lines l_1 and l_2.

[5] 5a. Find all 2 by 2 row reduced echelon form (RREF) matrices.

[5] 5b. 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.

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

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

$$\begin{aligned}x+y+2z&=6\\x-y+z&=1\\2x+y-z&=5\end{aligned}$$

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

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

[5] 9. Find values for *a* and *b* so that the following system of equations will have a solution where the value of *x* is twice the value of *y*.

$$\begin{aligned}3x+4y&=5\\ax+by&=0\end{aligned}$$

[10] 10. Find all values of α for which the following homogeneous system of linear equations has only one solution.

$$\begin{aligned}2x-2y+3z&=0\\-2x-y+6z&=0\\x+2y+\alpha z&=0\end{aligned}$$

Total value of all questions is 80 marks.