

## MATH 1010 Assignment 2

The values for each question are in brackets to the left of each question

1. Given the matrices shown, compute each of the following operations listed.

$$A = \begin{pmatrix} 1 & 2 & 4 \\ 2 & 6 & 0 \end{pmatrix} \quad B = \begin{pmatrix} 4 & 1 & 4 & 3 \\ 0 & -1 & 3 & 1 \\ 2 & 7 & 5 & 2 \end{pmatrix} \quad C = \begin{pmatrix} 2 & -1 & 3 \\ 1 & 3 & -2 \\ 4 & 0 & 1 \end{pmatrix} \quad D = \begin{pmatrix} -2 & 2 \\ 4 & -3 \\ -1 & 1 \end{pmatrix}$$

- [2] a)  $AB$   
[2] b)  $2D^T + A$   
[3] c) A matrix  $E$  such that  $3A^T + 2E = D$   
[3] d)  $(DA)^2$

2. Express each of the following systems of equations in the standard multiplicative form  $Ax=B$  and in the augmented matrix form.

[4] a) 
$$\begin{aligned} 2w - x + y - z &= 4 \\ 3w + 2x + 2z &= 1 \\ -3x + 2y &= 5 \\ w + x - z &= -3 \end{aligned}$$

b) 
$$\begin{aligned} 3a + b - 2c + d &= 1 \\ -2b - d &= 4 \\ a + 2c + 3d &= 3 \\ -3b - 2c &= 5 \end{aligned}$$

3. Solve the following system of equations, using the augmented matrix method. You must reduce the matrix to its row reduced echelon form and write out the complete solution to the system.

[6] a) 
$$\begin{aligned} x + 2y - z &= -1 \\ 2x - y + 2z &= 4 \\ 3x + y - 2z &= -9 \end{aligned}$$

$$\begin{aligned}
 & 10y - 4z + w = 1 \\
 & x + 4y - z + w = 2 \\
 [8] \quad & \text{b) } 3x + 2y + z + 2w = 5 \\
 & -2x - 8y + 2z - 2w = -4 \\
 & x - 6y + 3z = 1
 \end{aligned}$$

$$\begin{aligned}
 & -2b + 3c = 1 \\
 [6] \quad & \text{c) } 3a + 6b - 3c = -2 \\
 & 6a + 6b + 3c = 5
 \end{aligned}$$

[6] 4. Joe, Lisa and Darlene went to the grocery store to purchase some sandwich meat. Joe bought 200 grams of ham and 100 grams of turkey breast for \$4.60. Lisa bought 300 grams of ham and 200 grams of chicken breast for \$9.20. Darlene bought 200 grams of turkey breast and 100 grams of chicken breast for \$6.10. What are the prices / 100 grams for ham, turkey breast and chicken breast?

5. Find the inverse of the following matrices.

$$[14] \quad \text{a) } \begin{bmatrix} 3 & 4 & -1 \\ 1 & 0 & 3 \\ 2 & 5 & -4 \end{bmatrix} \qquad \text{b) } \begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & -1 & 3 & 0 \\ 2 & 1 & 5 & -3 \end{bmatrix}$$

6. Solve the following system of equations by determining the inverse of the matrix of coefficients and then using matrix multiplication.

$$\begin{aligned}
 & 5x + 3y + 2z = 4 \\
 [6] \quad & 3x + 3y + 2z = 2 \\
 & y + z = 5
 \end{aligned}$$

Total value of all questions is 60 marks.