Dawson College: Chem Tech / Lab Tech: 201-921-DW 01

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Name: SOLUTIONS

Student ID: _____

Quiz 5

Question 1. *(4 marks)* Determine whether or not $B = A^{-1}$. Show all of your work.

$$A = \begin{bmatrix} 5 & -2 \\ -2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$$

$$A \cdot B = \begin{bmatrix} 5 & -2 \\ -2 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} 5\cdot 1 + (-2)(2) & 5\cdot 2 + (-2)(5) \\ (-2)(1) + 1\cdot 2 & (-2)(2) + (1)(5) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

$$BA = \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}\begin{bmatrix} 5 & -2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} 1\cdot 5 + (2)(-2) & (1)(-2) + 2\cdot 1 \\ 2\cdot 5 + 5(-2) & (2)(-2) + 5\cdot 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

$$\therefore \quad B = A^{-1}$$

Question 2. *(6 marks)* Find the inverse of:

$$A = \begin{bmatrix} 1 & -3 & -2 \\ -2 & 7 & 3 \\ 1 & -1 & -3 \end{bmatrix}$$

$$\left[\begin{array}{ccc|ccc} 1 & -3 & -2 & 1 & 0 & 0 \\ -2 & 7 & 3 & 0 & 1 & 0 \\ 1 & -1 & -3 & 0 & 0 & 1 \end{array}\right] \xrightarrow[R_3 - R_1]{R_2 + 2R_1} \left[\begin{array}{ccc|ccc} 1 & -3 & -2 & 1 & 0 & 0 \\ 0 & 1 & -1 & 2 & 1 & 0 \\ 0 & 2 & -1 & -1 & 0 & 1 \end{array}\right] \xrightarrow[R_3 - 2R_2]{R_1 + 3R_1}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & -5 & 7 & 3 & 0 \\ 0 & 1 & -1 & 2 & 1 & 0 \\ 0 & 0 & 1 & -5 & -2 & 1 \end{array}\right] \xrightarrow[R_2 + R_3]{R_1 + 5R_3} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -18 & -7 & 5 \\ 0 & 1 & 0 & -3 & -1 & 1 \\ 0 & 0 & 1 & -5 & -2 & 1 \end{array}\right]$$

$$A^{-1} = \begin{bmatrix} -18 & -7 & 5 \\ -3 & -1 & 1 \\ -5 & -2 & 1 \end{bmatrix}$$