

ANSWERS TO SELECTED PROBLEMS FROM HOMEWORK 3

$$\textcircled{2} \text{ c) } B+C = \begin{bmatrix} 8 & -5 & -2 \\ 1 & 8 & 6 \\ 7 & -2 & 15 \end{bmatrix} \text{ so } (B+C)A = \begin{bmatrix} 20 & -30 & -9 \\ -10 & 37 & 67 \\ -16 & 0 & 71 \end{bmatrix}$$

$$\text{now } BA = \begin{bmatrix} 26 & -25 & -11 \\ -4 & 6 & 13 \\ -4 & -26 & 1 \end{bmatrix} \text{ AND } CA = \begin{bmatrix} -6 & -5 & 2 \\ -6 & 31 & 54 \\ -12 & 26 & 70 \end{bmatrix}$$

AND WE SEE THAT $BA+CA = (B+C)A$.

$$\textcircled{4} \text{ a) HERE } a=3, b=1, c=5, d=2 \text{ so } ad-bc=1 \text{ AND}$$

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

$$\textcircled{5} \text{ b) } B^{-1} = \begin{bmatrix} \frac{1}{5} & \frac{3}{20} \\ -\frac{1}{5} & \frac{1}{10} \end{bmatrix} \text{ AND } B^T = \begin{bmatrix} 2 & 4 \\ -3 & 4 \end{bmatrix}$$

$$\text{so } (B^{-1})^T = \begin{bmatrix} \frac{1}{5} & -\frac{1}{5} \\ \frac{3}{20} & \frac{1}{10} \end{bmatrix} \text{ AND } (B^T)^{-1} = \frac{1}{2 \cdot 4 - 4(-3)} \begin{bmatrix} 4 & -4 \\ 3 & 2 \end{bmatrix} = (B^{-1})^T$$

$$\textcircled{9} \text{ b) } P(A) = 2A^2 - A + I = 2 \begin{bmatrix} 11 & 4 \\ 8 & 3 \end{bmatrix} - \begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 20 & 7 \\ 14 & 6 \end{bmatrix}$$

$$\textcircled{11} \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}^{-1} = \frac{1}{\cos^2 \theta + \sin^2 \theta} \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$$