1-4 In-Class Exercise

1. $(5A^T)^{-1} = \begin{bmatrix} -3 & -1 \\ 5 & 2 \end{bmatrix}$

Find A

1-4 Suggested Exercise

$$A = \begin{bmatrix} 2 & 0 \\ 4 & 1 \end{bmatrix}$$

1. Compute $A^2 - 2A + I$

2. Compute $p(A)$ for the polynomial $p(x) = 2x^2 - x + 1$

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix},$$

3. Find all values of a, b, c, and d (if any) for which the matrices A and B commute.

4. Simplify the expression assuming that A, B, C, and D are invertible.

$$(AB)^{-1}(AC^{-1})(D^{-1}C^{-1})^{-1}D^{-1}$$

5. Show that if A, B, and $A + B$ are invertible matrices with the same size, then

$$A(A^{-1} + B^{-1})B(A + B)^{-1} = I$$

6. A square matrix A is said to be ***idempotent*** if $A^2 = A$.

   a. Show that if A is idempotent, then so is $I - A$.

   b. Show that if A is idempotent, then $2A - I$ is invertible and is its own inverse.

7. Assuming that all matrices are $n \times n$ and invertible, solve for D.

$$ABC^TDBA^TC = AB^T$$