Math 324
Practice Quiz #2 Name: ______________________

1. Let

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} -1 & 0 & 1 \\ 0 & 1 & -1 \end{bmatrix}$$

   Compue the following (where possible)

   1. $A + 2I$
   2. $3A$
   3. $I - A$
   4. AB
   5. BA
   6. $B^{\mathrm{T}}A$
   7. $B^{\mathrm{T}}A^{\mathrm{T}}$
   8. A^{T}
   9. A^{-1}
   10. B^{-1}

2. Prove that if A and B are both $n \times n$ matrices, then $\mathrm{tr}(A - B) = \mathrm{tr}(A) - \mathrm{tr}(B)$.

3. Invert the matrix

$$\begin{bmatrix} \cos(\theta) & \sin(\theta) \\ -\sin(\theta) & \cos(\theta) \end{bmatrix}$$

4. Suppose A is an $n \times n$ matrix. Show that if $A^3 - 2A + I = 0$, then A^{-1} exists and $A^{-1} = 2I - A^2$.

5. Invert the matrix

$$\begin{bmatrix} 3 & 4 & -1 \\ 1 & 0 & 3 \\ 2 & 5 & -4 \end{bmatrix}$$