MATH 54 - QUIZ 4

Write your name and section number at the top. There are ten points total, and problems on both sides of this sheet. Show your work clearly and neatly, where relevant.

1. **Computations - 2 points each**

   (1) Compute the inverse of the matrix
   
   \[
   \begin{bmatrix}
   1 & 0 & -2 \\
   -3 & 1 & 4 \\
   2 & -3 & 4
   \end{bmatrix}
   \]

   (2) Compute the matrix product \(AB\), where
   
   \[
   A = \begin{bmatrix}
   1 & 0 & 1 \\
   0 & 1 & 0
   \end{bmatrix}, \quad B = \begin{bmatrix}
   2 & 2 \\
   1 & 2 \\
   1 & 3
   \end{bmatrix}
   \]

   (3) If \(T : \mathbb{R}^2 \to \mathbb{R}^2\) is reflection across the line \(y = -x\), determine the matrix of \(T\) (with respect to the standard basis \(\left\{\begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix}\right\}\) for \(\mathbb{R}^2\)).
2. True or False - 1 point each

(1) If $m \leq n$, then any linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$ is onto.
(2) For a linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$, if $T(x_1) = T(x_2)$, then the vector $x_1 - x_2$ is in the kernel of $T$.
(3) If $A$ is an invertible $n \times n$ matrix, then its transpose $A^T$ is also invertible.
(4) If $A$ is an $m \times n$ matrix, and there exists another matrix $C$ such that $CA$ is the $n \times n$ identity matrix $I_n$, then there is also a matrix $D$ such that $AD = I_m$. 