

Philadelphia University Department of Basic Sciences and Mathematics



Academic Year:	2015-2016	Course Name:	Linear Algebra $(1)^1$
Semester:	Second Semester	Course Number:	250241
Exam:	First Exam	Instructor Name:	Feras Awad
Exam Date:	06/04/2016	Student Name:	
Exam Date: Exam Day:	06/04/2016 Wednesday	Student Name: University ID:	

1. (2 points) Simplify the expression $(AB)^{-1}(AC^{-1})(D^{-1}C^{-1})^{-1}D^{-1}$ assuming that A, B, C, and D are invertible.

2. (2 points) Find the values of x that make the matrix $\begin{bmatrix} 9 & -x \\ x & -1 \end{bmatrix}$ singular.

¹Internal Examiner : Dr. Marouf Samhan

3. (2 points) If A is an $m \times n$ matrix such that $A^T B A$ is defined, find the size of the matrix B. 4. (3 points) Find the matrix A if $(5A^T)^{-1} = \begin{bmatrix} -3 & -1 \\ 5 & 2 \end{bmatrix}$. [2]

5. (2 points) Show that if A and B are commute, then $(AB)^{-1} = A^{-1}B^{-1}$.

6. (3 points) A square matrix A is said to be *idempotent* if $A^2 = A$. Show that if A is idempotent then (2A - I) is invertible and is its own inverse.

7. (6 points) Solve the following linear system using Gaussian elimination with back substitution.

 $\begin{array}{rrr} x_1 & -3x_3 = -2 \\ 3x_1 + & x_2 - 2x_3 = 5 \\ 2x_1 + 2x_2 + & x_3 = 4 \end{array}$