Name (*Last, First*): _____, ID: _____.

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Name (Last, First): _____, ID: _____.

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1) *Provide complete solutions in the space provided.*

2) *Complete question 6 with the use of SCILAB. Copy/paste the output or use screenshot and attach it to this assignment.*

3) *Late assignments (submitted within 24 hours after the due date) will be penalized by 25%. After 24 hours, no assignments will be accepted.*

1. Find A and B knowing the following:

a) $(\frac{1}{5}A^T)^{-1} = \begin{bmatrix} 5 & -15 \\ 0 & 10 \end{bmatrix}$ [3 marks]

b) $2(B)^{-3} = \begin{bmatrix} 16 & 0 & 0 \\ 0 & 128 & 0 \\ 0 & 0 & -2 \end{bmatrix}$ [3 marks]

2. Find ***x*** and ***y*** so that both A and B matrices below are not invertible:

[4 marks]

$$A = \begin{bmatrix} 6x + 2y & 0 \\ 0 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} x^2 - 9 & 0 \\ 0 & 2 \end{bmatrix}$$

3. Find ***m*** and ***n*** so that the matrix below is symmetric:

[4 marks]

$$A = \begin{bmatrix} 4 & m + 2n & 1 \\ 0 & 5 & 10 \\ 1 & m + 5n - 2 & -3 \end{bmatrix}$$

4. Solve the following system by using the inverse of a matrix ($X = A^{-1}$B):

[4 marks]

$3x - y = 7$
$x + 2y = -7$

5.Consider the following expression:

$$(A^T B^T)^T A^{-1} B^{-1} (C^T)^{-1} (DC)^T$$

Assume that D is a lower triangular matrix.

a) Simplify this expression using the algebraic properties of matrices. Show all the work. [3 marks]

b) What special matrix is represented by the simplified expression in part a)?

[1 mark]

6. Use *SCILAB* to perform the necessary operations to decode the following message: [3 marks]

$$33, 45, 17, 23, 9, 9, 38, 57, 32, 39, 11, 16, 40, 60$$

given the encoding matrix is:

$$A = \begin{bmatrix} 2 & 1 \\ 3 & 1 \end{bmatrix}$$

Consider the letters of the alphabet translated into numbers following the scheme shown below. Copy and paste Scilab output. Write the decoded message.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
O	P	Q	R	S	T	U	V	W	X	Y	Z	!	?	.
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29