## King Fahd University of Petroleum & Minerals Department of Mathematics and Statistics MATH 280-01(Term 162) Exam I 15 March 2017

NAME:	
ID #:	
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Question	points	Score
1	12	
2	12	
3	12	
4	14	
5	10	
6	12	
7	12	
8	16	
Total	100	

Q1. Let

$$A = \begin{bmatrix} 1 & 0 & 3 \\ 1 & 1 & 3 \\ 0 & 1 & 1 \end{bmatrix}$$

Find  $A^{-1}$  and use it to solve the system

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

Q2. Let

$$A = \begin{bmatrix} 1 & 2 & -3 \\ -1 & 1 & -1 \\ 0 & -2 & -3 \end{bmatrix}$$

Find the LU factorization of A and use it to find  $\det(A)$ 

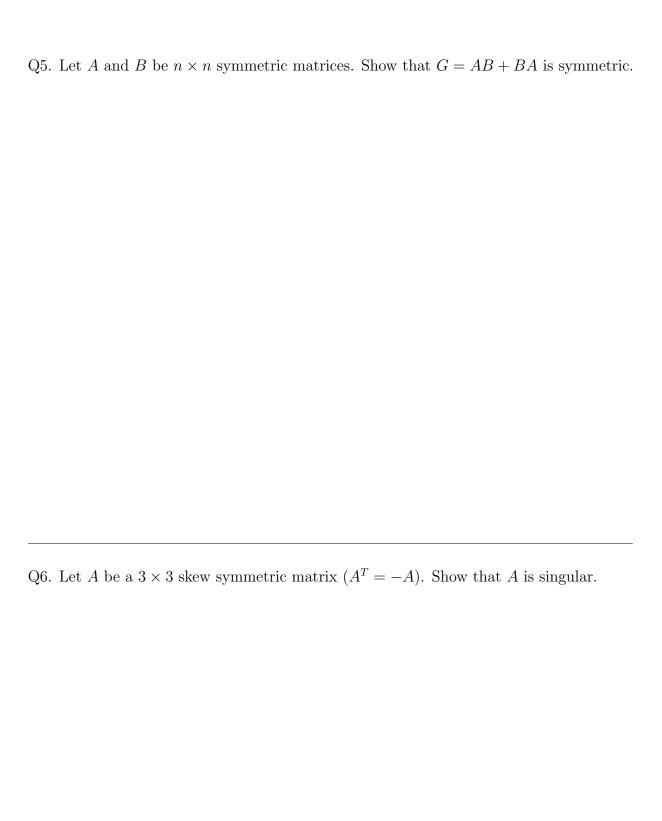
Q3. Let A and B be  $3 \times 3$  matrices with det(A) = x and det(B) = y. Let E be a  $3 \times 3$  elementary matrix of type I. Use properties of determinants to compute (Justify your steps):

- (i) det(5A)
- (ii)  $det(A^{-1}B)$
- (iii)  $det(EAB^T)$

Q4. Let S be a subset of  $\mathbb{R}^3$  such that

$$S = \{(x, y, z)^T | 2x - y + z = 0\}$$

Show that S is a subspace of  $\mathbb{R}^3$ 



Q7. Let A be a nonsingular matrix. Define the adjoint of A (adjA). Show how to use it to find  $A^{-1}$ 

Q8. Show that if A is nonsingular then adjA is nonsingular and

$$(adjA)^{-1} = det(A^{-1})A = adjA^{-1}$$