Birzeit University
Mathematics Department

HW | Math 234 | 2017/2018

Name................................... Number................. Section ....

(Q1) [*60 points*] Fill the blanks with true (T) or false (F).

[ ] (1) If E an elementary matrix of type II, then it is both nonsingular and symmetric.

[ ] (2) If A and B are $n \times n$ symmetric matrices, then the matrix $AB + BA$ is also symmetric.

[ ] (3) If A is an $n \times n$ singular matrix, then the system $Ax = b$ has infinitely many solutions.

[ ] (4) If E is an elementary matrix of type III, then $E^{-1} = E$.

[ ] (5) If A and B are symmetric matrices, then AB is also symmetric.

[ ] (6) If $A^2 = I$, then $A^{-1} = A$.

[ ] (7) The product of two elementary matrices is an elementary matrix.

[ ] (8) Any $m \times n$ linear system $Ax = 0$ has a nontrivial solution if $m > n$.

[ ] (9) If A is a nonsingular matrix, then A^T is nonsingular.

[ ] (10) The sum of two triangular matrices is a triangular matrix.

[ ] (11) If E is an elementary matrix, then E^T is also elementary of the same type.

[ ] (12) If A is a singular matrix, then the system $Ax = 0$ has infinite number of solutions.

[ ] (13) If A is a singular matrix and U is the $RREF$ of A, then U must have al least one zero row.

[ ] (14) Any invertible matrix is a product of elementary matrices.

[ ] (15) If A is symmetric and nonsingular, then A^{-1} is symmetric.

[ ] (16) All 5×5 nonsingular matrices are row equivalent.

[ ] (17) If A is a square matrix and the system $Ax = 0$ has a nontrivial solution, then A is nonsingular.

[ ] (18) If A is an $n \times n$ nonsingular matrix, then A^3 is nonsingular.

[ ] (19) If A is a nonsingular matrix and α a nonzero scalar, then $(\alpha A)^{-1} = \alpha A^{-1}$.

[ ] (20) If A and B are $n \times n$ diagonal matrices, then $AB = BA$.

[ ] (21) If A is a 3×3 matrix with $a_1 = a_2 = a_3$, then $Ax = 0$ has infinitely many solutions.

[ ] (22) If A and B are nonsingular $n \times n$ matrices, then $A + B$ is also nonsingular.

[ ] (23) If A is both symmetric and skew-symmetric, then A is a zero matrix.

[ ] (24) If the system $Ax = b$ is consistent, then b is a linear combination of the columns of A.

[ ] (25) A square matrix A is nonsingular iff its RREF is the identity matrix.

[ ] (26) If b can be written as a linear combination of the columns of a singular matrix A, then the system $Ax = b$ has infinitely many solutions.

[ ] (27) If A, B, C are $n \times n$ nonsingular matrices, then $A^2 - B^2 = (A - B)(A + B)$.

[ ] (28) If b is any column of the matrix A, then the system $Ax = b$ is consistent.

[ ] (29) The sum of a symmetric and skew-symmetric matrices is skew-symmetric.

[ ] (30) Let A be nonsingular. If A is skew-symmetric, then A^{-1} is skew-symmetric.

[ ] (31) Let A be nonsingular. If A is upper triangular, then A^{-1} is upper triangular.

[ ] (32) Let A be nonsingular. If A is diagonal, then A^{-1} is diagonal.

[ ] (33) If A is a 3×3 matrix and $(2, 3, -1)^T$ is a solution to $Ax = 0$, then $(-6, -9, 3)^T$ is also a solution.

[ ] (34) If the square system $Ax = b$ has more than one solution, then A is singular.

[ ] (35) If A is a 4×4 nonsingular matrix, then AA^T is both symmetric and nonsingular.

[ ] (36) If A is a 4×4 matrix and $Ax = 0$ has only the zero solution, then A is row equivalent to I.

[ ] (37) If A is a nonsingular matrix, then $(A^T)^T = (A^{-1})^{-1}$.

[ ] (38) Every linear system with eight unknowns in three equations is consistent.

[ ] (39) If the augmented matrix of a 3×2 system is row equivalent to I, then this system is inconsistent.

[ ] (40) The identity matrix is row equivalent to any elementary matrix of the same size.