Birzeit University

Mathematics Department

Chapter 2 Math 234 2017/2018

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

(Q1) [*100 points*] Fill the blanks with true (T) or false (F).

[ ] (1) If $A^2 = I$, then $det(A) = \pm 1$

[ ] (2) If A and B are $n \times n$ nonsingular matrices, then $det(A - B) = det(A) - det(B)$.

[ ] (3) If A is an 2×2 matrix, then $|\alpha A| = \alpha^4 |A|$.

[ ] (4) If $det(A) = 1$, then $A^{-1} = adjA$.

[ ] (5) If A and B are $n \times n$ matrices such that AB is singular, then at least A or B is singular.

[ ] (6) If $A = \begin{bmatrix} 2 & 5 & 7 \\ 1 & 3 & 4 \\ 2 & 1 & 6 \end{bmatrix}$, then the $(2, 3)$ entry of A^{-1} is $-\frac{1}{3}$.

[ ] (7) If A and B are 2×2 matrices such that $det(BA) = 0$, then $det(A) = 0$ and $det(B) = 0$.

[ ] (8) If A and B are $n \times n$ matrices, then $det((AB)^T) = det(A)det(B)$.

[ ] (9) Row equivalent matrices have the same determinants.

[ ] (10) If A is singular, then $adjA$ is also singular.

[ ] (11) Cramer's rule can be used to solve any square linear system.

[ ] (12) If A and B are $n \times n$ matrices and A is singular, then AB is singular.

[ ] (13) $det(AB) = det(A)det(B)$ only when A and B are nonsingular.

[ ] (14) If A is an $n \times n$ matrix, then $|A^n| = |A|^n$.

[ ] (15) Every diagonal matrix is nonsingular.

[ ] (16) Every Elementary matrix is nonsingular.

[ ] (17) $det(-I) = -det(I)$.

[ ] (18) If A is a 5×5 skew-symmetric matrix, then the system $Ax = 0$ has a nontrivial solution.

[ ] (19) $|AB| = |BA|$ for any $n \times n$ matrices A and B.

[ ] (20) If A, B, S are $n \times n$ matrices such that S is nonsingular and $A = SBS^{-1}$, then $|A| = |B|$.

[ ] (21) If A is a 7×7 nonsingular matrix, then the RREF of A has 7 nonzero rows.

[ ] (22) If $|A| = 1$, then $A = I$.

[ ] (23) If $A = LU$ is the LU factorization of A and U is nonsingular, then A is nonsingular.

[ ] (24) If A is a singular matrix and U is the REF of A, then $|U| = 0$.

[ ] (25) If A is a square and nonsingular matrix with $|adjA| = |A|$, then A is 2×2.

[ ] (26) If A and B are square nonzero matrices with $AB = 0$, then both A and B are singular.

[ ] (27) If $det(A) = 0$, the A is a zero matrix.

[ ] (28) If the diagonal entries of a square matrix are all zero, then it is singular.

[ ] (29) If A is a 3×3 with $a_1 = a_3$, then $det(A) = 0$.

[ ] (30) If the system $A^3x = 0$ has a nontrivial solution, then A is singular .

[ ] (31) If E is a 4×4 elementary matrix, then the linear system $Ex = b$ is consistent for any $b \in \mathbb{R}^4$.

[ ] (32) If A is a square matrix and one of the rows is a linear combination of the others, then $|A| = 0$.

[ ] (33) If A is an $n \times n$ matrix with $n > 1$, then $|adjA| = |A|^{n-1}$.

[ ] (34) If A is an $n \times n$ matrix, then $det(A^TA) \geq 0$.

[ ] (35) There is a matrix A such that $A^{-1} = \begin{bmatrix} 4 & 2 \\ 6 & 3 \end{bmatrix}$.

[ ] (36) If A^T is singular, then A^2 is also singular.

[ ] (37) There exists a nonsingular matrix with two identical columns.

[ ] (38) A matrix having a zero row cannot be row equivalent to I .

[ ] (39) If E and F are 2×2 elementary matrices of type I and III respectively, then $det(-2E^TF^{-1}) = 4$.

[ ] (40) If A is a nonsingular diagonal matrix, then A^{-1} is also diagonal.

[ ] (41) $det(AB^T) = det(A^TB)$ for any $n \times n$ matrices A and B.

[ ] (42) If $det(A - B) = 0$, then $A = B$.

[ ] (43) If $det(A - B) = 0$, then the matrix equation $Ax = Bx$ has a nonzero solution.

[ ] (44) A triangular matrix is nonsingular if and only if its diagonal elements are all nonzero.

[ ] (45) If A is a nonzero matrix with $A^k = 0$ for some positive integer k, then A is singular.

[ ] (46) If x and y are two distinct vectors in $\mathbb{R}^n$ such that $Ax = Ay$, then $det(A) = 0$.

[ ] (47) If A and B are 3×3 matrices with $|A| = 2$ and $|B| = -6$, then $|-3AB^{-1}| = 9$.

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

[ ] (49) If A is a symmetric matrix, then $adjA$ is also symmetric.

[ ] (50) If E and F are 3×3 elementary matrices of type I and A is 3×3, then $|-AEF| = |A|$.