

1.

Which of the following is correct?

The product of a number and a vector is a dot - 2 answers

3%

The dot product of two vectors is a number - 67 answers

96%

The vector of dots is a line - 1 answer

1%

The dot product of two vectors is never 0. - 0 answers

0%

Which of the following is incorrect?

In the 3D space any three vectors are independent. - 66 answers

86%

The linear combinations of two vectors can fill a plane. - 0 answers

0%

If I add a vector of length 2 and a vector of length 3 I can get a vector of length 1. - 8 answers

10%

In the 2D plane we can find two dependent vectors. - 3 answers

4%

$v+v+v$ is always

a unit vector - 2 answers

3%

longer than v - 5 answers

6%

the zero vector - 0 answers

0%

equal to $3v$ - 72 answers

91%

2.

Which of the following is correct?

It is possible that a line and a plane (in the space) do not intersect. - 59 answers

86%

Three planes (in the space) always intersect in one point - 2 answers

3%

Two lines (in the plane) always intersect in one point. - 1 answer

1%

If three planes (in the space) do not intersect, then two of them must be parallel. - 7 answers

10%

Which of the following is incorrect?

During elimination we can run into impossible equations. - 12 answers

15%

If two equations are the same then we obtain $0=0$ during elimination. - 14 answers

17%

If we obtain $0=0$ during elimination then there were two identical equations. - 39 answers
48%
No pivot can be 0. - 17 answers
21%

The matrix product AB exist if

A has as may columns as B. - 2 answers
2%
the number of columns of A is equal to the number of rows of B. - 72 answers
83%
the number of rows of A is equal to the number of columns of B. - 12 answers
14%
A and B are square. - 1 answer
1%

3.

Which of the following is correct?

If A,B,C are such that $AB=I$ and $CA=I$, then $B=C$. - 27 answers
43%
If $AB=BA$ then $AB=I$. - 16 answers
25%
If $Ax=0$ has a solution then A has no inverse. - 15 answers
24%
If A has no inverse, then $AB=0$ for any B. - 5 answers
8%

Which of the following is incorrect?

There are block matrices that cannot be multiplied. - 9 answers
11%
There are block matrices that can be added. - 1 answer
1%
If two block matrices can be multiplied and we remove the separators then they can still be multiplied. - 26 answers
31%
If two matrices can be multiplied and we add separators to make them block matrices then they can be multiplied as block matrices. - 47 answers
57%

We get the "augmented matrix" if we

extend A with the new column b, where $Ax=b$ is a system of linear equations. - 89 answers
97%
sum two matrices - 0 answers
0%
split a matrix horizontally. - 3 answers
3%
split a matrix vertically. - 0 answers
0%

4.

Which of the following is correct?

The product AA^T is always invertible. - 7 answers

9%

If $AB=I$ then $A^T B^T=I$. - 20 answers

27%

If A is invertible then its columns are independent of its rows. - 13 answers

17%

If A is invertible then $Ax=0$ holds only for $x=0$. - 35 answers

47%

Which of the following is incorrect (A is a square matrix)?

If A is invertible then A has an LU decomposition. - 10 answers

14%

If $PA=LU$ is a P,L,U decomposition then P is a permutation matrix. - 11 answers

15%

In an LU decomposition the diagonals of U are the pivots. - 17 answers

23%

If $A=LU$ is the LU decomposition of A such that U is invertible then A is invertible. - 36 answers

49%

Let P be a permutation matrix. Then P

is lower triangular. - 2 answers

2%

is upper triangular. - 0 answers

0%

is equal to its transpose. - 19 answers

22%

has the same rows as I but in a (possibly) different order. - 66 answers

76%

5.

Which is correct?

If some set of vectors spans V and we throw away one vector, they still span V . - 10 answers

13%

If V is a vector space then $\dim(V)$ is the cardinality of a basis. - 47 answers

62%

If some set of vectors are independent in V and we add one new vector, they are still independent. -

17 answers

22%

If some vectors span V then there are a few among them which are dependent. - 23 answers

30%

Which is incorrect?

Every vector space has a basis. - 2 answers

2%

Every vector space has dimension. - 1 answer

1%

Every matrix has independent columns. - 79 answers

91%

Every matrix has a column space. - 5 answers

6%

If A is an $m \times n$ matrix of rank r then

$n-r$ is the number of special solutions. - 71 answers

80%

Then $r = \text{minimum of } n \text{ and } m$. - 8 answers

9%

$r=1$ occurs only for the zero matrix. - 5 answers

6%

The last $r-m$ rows of the reduced row echelon form are fully zero. - 5 answers

6%

6.

Let A be any $m \times n$. Which of the following is always correct?

$N(A)$ and $C(A)$ are orthogonal. - 19 answers

22%

The nullspace and the left nullspace are of the same dimension. - 2 answers

2%

$N(A)$ and $C(A)$ are orthogonal complements. - 11 answers

13%

The sum of the dimensions of $C(A)$ and $N(A)$ is n . - 54 answers

63%

Which is incorrect?

If a matrix A has two columns and these are nonzero but dependent then they are multiples of each other. - 3 answers

4%

If R is the reduced row echelon form of A then $N(A) = N(R)$ has a common basis: the special solutions. - 12 answers

15%

If $Ax=b$ is solvable then x can be taken from the row space. - 31 answers

38%

If R is the reduced row echelon form of A then $C(A) = C(R)$. - 36 answers

44%

Let A be a non-square matrix and B its transpose. Then

$\dim N(A) = \dim N(B)$ - 13 answers

14%

$\dim C(A) = \dim C(B)$ - 30 answers

33%

$\dim C(A) = \dim N(B)$ - 29 answers

32%

$\dim N(A) = \dim C(B)$ - 18 answers

20%

7.

Which is correct?

If $A^T A = I$, then A has orthogonal columns. - 17 answers
23%

If A has orthogonal columns then $A^T A = I$. - 16 answers
22%

If $A^T A = I$, then A is an orthogonal matrix. - 27 answers
36%

If $A^T A$ is diagonal, then A has orthonormal columns. - 14 answers
19%

Which is incorrect?

If Q is orthogonal, then $Q^T Q = I$. - 7 answers
8%

If Q is orthogonal, then Q^T is also orthogonal. - 19 answers
22%

If A and B are orthogonal, then AB is also orthogonal. - 27 answers
32%

If Q is orthogonal, then $I - Q$ is also orthogonal. - 32 answers
38%

Which of the following is a good description of the reflection matrix?

If u is a unit vector then $I - u u^T$ is a reflection matrix - 12 answers
14%

If u is a unit vector then $I - u u^T$ is a reflection matrix - 45 answers
54%

If u is any vector then $I - u u^T$ is a reflection matrix - 12 answers
14%

If $A = I - u u^T$ is a reflection matrix then u is a unit vector - 14 answers
17%

8.

Which is correct? (A is a square matrix)

Singular matrices have no determinant. - 14 answers
16%

If $\det(A) = 0$ then $A = 0$. - 2 answers
2%

If $\det(A) = 0$ then the rank of A is 0. - 8 answers
9%

If A is invertible then $\det(A)$ is not 0. - 65 answers
73%

Which is incorrect? (all matrices are $n \times n$)

If $PA = LU$ then $\det(A) = \det(U)$. - 16 answers
18%

$\det(AB) = \det(B)\det(A^T)$ - 53 answers

60%

if $BA=2I$ then $\det(B)=2^n / \det(A)$. - 13 answers

15%

If P is an odd permutation matrix then $\det(P)=-1$. - 6 answers

7%

Let A be an $n \times n$ matrix. Then $|A|$ does not change if

we exchange two of its rows - 11 answers

12%

we exchange two of its columns - 5 answers

5%

add the first row to the second - 72 answers

79%

add 1 to every element of its first row. - 3 answers

3%