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| **Term** | **Definition** |
| Rank of a matrix | is the number of linearly independent row or column vectors in the matrix. The rank of a matrix can be determined through Gaussian elimination. |
| Matrices | a rectangular array of numbers. A matrix has rows and columns  ⎥⎦  If , then  In data science/statistics, each row often represents a sample/an observation and the columns represent variables/factors/predictors. For example, if a dataset contains 5 characteristic traits of 27 customers, then the matrix has 5 rows and 27 columns. |
| Determinant | of a square matrix is a single number. When the determinant of a matrix is 0, the matrix is not invertible. |
| Identity matrix | When a diagonal matrix has only 1s in its diagonal elements, |
| Vectors | an array of number written as a column enclosed by square brackets, e.g  This vector contains elements. If each element of is in , |
| Scalars | a single number, e.g |
| Diagonal matrix | when a square matrix with only non-zero elements on the diagonal and zeros elsewhere, e.g. |

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| **Term** | **Definition** |
| Matrix transpose | when the row of matrix becomes the column of another matrix. For example, for a matrix  The transpose of , |
| Norms | is the length of a vector from the origin,  where . The most common choice of is , which is also known as the Euclidean norm.  In many contexts, the Euclidean norm may not be suitable. This is because it increases slower as the vector is closer the origin. Therefore, when the difference between exactly zero and a value close to zero (but not zero) is important, a different is used. One is to set , this will ensure the norm increases linearly with the distance.  **Max norm** is another common norm, the distance is represented by the maximum absolute value of the element in the vector,  **Frobenius norm** commonly used in deep learning as the measure of a matrix size, |
|  | The most efficient way to calculate is by firstly writing the augmented matrix, and then using row reduction. At the end of row reduction, the augmented matrix becomes , thus matrix on the right side of divider is the inverse matrix.  Another method to find is the adjugate method. |

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| **Term** | **Definition** |
| Trace operator | gives the sum of all diagonal elements of a square matrix. For example, a matrix ,  The trace of is |
| Orthogonal | Two vectors are orthogonal when the product of two vectors is zero, e.g.  The vectors are orthonormal if  **Orthogonal matrix** is a square matrix whose rows are mutually orthonormal and whose columns are mutually orthormal such that  This implies inverse of matrix is also the transpose of the matrix, i.e. |
| Square matrix | when there are equal numbers of rows and columns in a matrix, e.g. matrix, matrix etc. |
| Inverse matrix | Suppose a square matrix has an inverse matrix (or when matrix is invertible), then has the property such that |
| Singular matrix | is a square matrix whose columns are not linearly independent. When a matrix is singular, . |