

Instructions.

In this problem you will be given a few statements. For each statement you need to decide if it is true or not, and justify your answer.

How to justify your answer.

- In order to show that a statement is false, it suffices to give a counterexample. For example, consider the the statement:

The last digit of every even number is either 2, 4, or 8.

To show that this statement is false, it is enough to point out that, for example, 10 is an even number, but its last digit is 0.

- In order to show that a statement is true, you need to provide a reasoning explaining why it is true in all instances. Giving one example when it is true will not suffice, since the statement may not work in some other cases. For example, consider the the statement:

If n is an even number then $n + 2$ is also an even number.

You can justify that this is true as follows. Even numbers are integers which are multiples of 2. If n is even then $n = 2m$ for some integer m . Then $n + 2 = 2m + 2 = 2(m + 1)$, which shows that $n + 2$ is even.

Note

This problem will not be collected or graded. However, problems of this type will appear on exams in this course.

For each of the statements given below decide if it is true or false. If you decide that it is true, justify your answer. If you think it is false give a counterexample.

- a) If A is a 3×6 matrix then A can have at most 3 pivot columns.
- b) If a system of linear equations has more variables than equations, then it can happen that this system has exactly one solution.
- c) If a system of linear equations has more variables than equations then it must have infinitely many solutions.
- d) If A is an augmented matrix of a system of linear equations such that all entries of the column of constants are equal to 0, then the system of equations represented by A is consistent.
- e) If the augmented matrix of a system of linear equations contains a row of the form

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 5 \end{bmatrix}$$

then this system has exactly one solution.