

## Algebra A – Learning Log 7

The study goal is to understand how culture influences students' mathematical conceptions and learning skills.

In this study, you will be asked to answer questions. Some of them will be mathematical questions, regarding the material of the course. In other questions you will be asked to reflect on the previous answers that you gave and about your learning process in the course.

Taking part in this study is completely voluntary. There are no right or wrong answers. The records of this study will be kept private, and will not affect your course grade. Answering the mathematical questions incorrectly will not affect your course grade.

If you decide not to take part or to skip some of the questions, it will not affect your course grade. If you decide to take part, you are free to withdraw at any time.

If you decide to participate you will benefit a **bonus of 2 points** added to your final grade (see details on the course website).

If you have any questions, please don't hesitate to contact me, at:  
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Thank you for your participation.

**Definition:**

Given a matrix  $A \in \mathbb{F}^{n \times n}$ , a polynomial  $p(A)$  in the matrix  $A$  is

$$p(A) = a_m A^m + a_{m-1} A^{m-1} + \dots + a_1 A + a_0 I,$$

where  $a_i \in \mathbb{F}$  are scalar coefficients and  $I \in \mathbb{F}^{n \times n}$  is the identity matrix.

**Answer the following problem:**

Prove that for every matrix  $A \in \mathbb{F}^{n \times n}$  there exists a non-zero polynomial (e.g., there exists a non-zero coefficient  $a_i$ ) such that  $p(A) = 0$ .

**Answer the following questions:**

1. Rate the difficulty of the given problem.

(1 - very easy, 9 - very hard)

**1      2      3      4      5      6      7      8      9**

2. Suppose the problem is given an exam, and is worth 20 points. How many points do you think you gained for your solution? Please explain.

3. Do you agree with the following statements?

(1 - don't agree at all, 9 - strongly agree)

(a) The purpose of the problem is to evaluate algorithmic skills, such as arithmetic calculations, technical skills, solving methods, etc.

**1      2      3      4      5      6      7      8      9**

(b) The purpose of the problem is to evaluate cognitive skills, such as intuitive understanding, train of thought, strategy, etc.

**1      2      3      4      5      6      7      8      9**

(c) The purpose of the problem is to evaluate formal skills, such as mathematical logic, proof structure, proper writing, etc.

**1      2      3      4      5      6      7      8      9**

4. Complete the following sentence:

**“Learning mathematics is important because ... ”**