

## Algebra A – Learning Log 9

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:  
**[lital.shemen@gtiit.edu.cn](mailto:lital.shemen@gtiit.edu.cn)**

Thank you for your participation.

**Notations:**

$T : V \rightarrow V$  and  $S : V \rightarrow V$  are linear transformations on a vector space  $V$ .  
 $S \circ T : V \rightarrow V$  is the composition, defined as  $S \circ T(v) = s(T(v))$ , and is also a linear transformation (verify you understand why).

$\text{Ker}(T)$  is the kernel or the null space, defined as

$$\text{Ker}(T) = \{v \in V : T(v) = 0\}.$$

$\text{Im}(T)$  is the image, defined as

$$\text{Im}(T) = \{T(v) \in V : v \in V\}.$$

**Answer the following problem:**

Prove or disprove the following claims:

- (a) If  $\text{Ker}(S \circ T) = \{0\}$  and  $T$  is onto, then  $\text{Ker}(S) = \{0\}$  and  $\text{Ker}(T) = \{0\}$ .
- (b) If  $\text{Im}(S \circ T) = \{0\}$ , then  $\text{Ker}(S) = V$  or  $\text{Ker}(T) = V$ .
- (c) If  $\text{Im}(S \circ T) = \{0\}$ , then  $\text{Im}(T) \subseteq \text{Ker}(S)$ .

**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**

What helped you solve the problem?

2. Suppose the problem is given in the 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. (a) Does your experience in GTIIT so far meet you expectations of how you thought it would be? Can you give an example of something that surprised you, and wasn't as you previously expected?

(b) Supposed you were asked to give an advise to a new student starting their studies in the MCS program in GTIIT, what advise would you give them?

(c) Do you enjoy your time in GTIIT so far?  
(1 - I don't enjoy at all, 9 - I enjoy a lot)

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

Please elaborate: