

AGLA 1. Retake of TEST 1. 15 points, 60 minutes

Full name:	Group:

Task:	1	2	3	4	5	6	Total
Score:							

**In each sheet**, you **should** write your last name, first name, variant number, and group number in the **upper right** corner. Unsigned sheets or sheets without the information above will **NOT** BE graded.

1. (2 points) For each of the following statements mark it as True or False. Justify each answer.

1)  $\det \begin{bmatrix} 1 & 2 \\ 2 & 4 \\ 3 & 6 \end{bmatrix} = 0$

2) The result of Scalar triple product operation is a vector.

3) Any subset of vectors form a subspace

4) Rank can be greater than a number of rows of a matrix.

2. (2 points) Decompose the vector  $\mathbf{p} = (1, 2, 3)$  into components parallel and perpendicular to the vector  $\mathbf{q} = (1, -2, 2)$ .

3. (2 points)

(a) Find the matrix product  $AB$  if  $A = \begin{bmatrix} 2 & x & 5 \\ 4 & 3 & -2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & x \\ -3 & 2 \\ -1 & 2 \end{bmatrix}$

(b) Find the largest possible value of determinant  $(AB)$ .

4. (3 points) Find a transformation matrix from  $XOY$  to  $X'O'Y'$  (length of vectors is important).

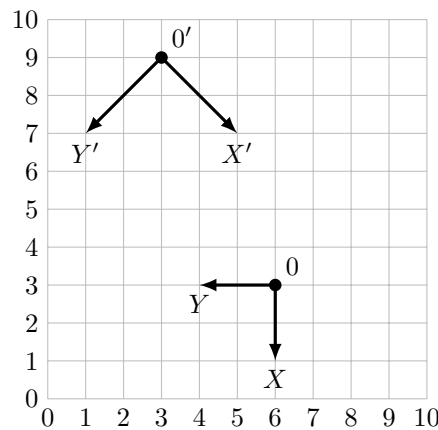


Figure 1: Task 4

5. (3 points) Prove that the result of a cross product will not change if to one of the vectors add vector  $\vec{x}$  such that  $\vec{x}$  is collinear to another vector.
6. (3 points) It is known that  $A^2 + A + I = O$  ( $O$  is a zero matrix) for a square matrix  $A$ . Is it true that matrix  $A$  is invertible? If it is so, how can we find the inverse matrix?