

Math 113 Spring 2007

HW#2: Matrices.

1. Let $A \in M_3(\mathbb{R})$. Denote by $v_1, v_2, v_3 \in \mathbb{R}^3$ the rows of A . Show that $\det(A) = \pm \text{Vol}(v_1, v_2, v_3)$ the volume of the parallelepiped defined by v_1, v_2, v_3 .
2. A matrix $A \in M_n(\mathbb{R})$ is called orthogonal if $AA^t = I$. Show that for orthogonal matrix A we have $\det(A) = \pm 1$.
3. Consider matrices $A, B \in M_n(\mathbb{R})$. Show that if $(AB)^t = A^t B^t$ then A and B commutes, i.e., $AB = BA$.
4. In Artin, Chapter 1, Section 2, Problems 2, 5. Section 3, Problem 1 (page 33, 34).
5. In Artin Chapter 1, Section 1, Problems 19, 20 (page 33).

• **Remarks**

- You are very much encouraged to work with other students. However, submit your work alone.
- I will be happy to help you with the homeworks. Please visit me if you want to work with me.

Good Luck!!