

Remark Theorem[section] Problem Proposition[section] Lemma[section] [theorem]Corollary Example[section] [problem]Definition

1. Find all real roots of the equation

$$\sqrt{x^2 - p} + 2\sqrt{x^2 - 1} = x,$$

where p is a real parameter.

2. Point A and segment BC are given. Determine the locus of points in space which are vertices of right angles with one side passing through A , and the other side intersecting the segment BC .
3. In an n -gon all of whose interior angles are equal, the lengths of consecutive sides satisfy the relation

$$a_1 \geq a_2 \geq \dots \geq a_n.$$

Prove that $a_1 = a_2 = \dots = a_n$.

4. Find all solutions x_1, x_2, x_3, x_4, x_5 of the system

$$x_5 + x_2 = yx_1$$

$$x_1 + x_3 = yx_2$$

$$x_2 + x_4 = yx_3$$

$$x_3 + x_5 = yx_4$$

$$x_4 + x_1 = yx_5,$$

where y is a parameter.

5. prove that $\cos \frac{\pi}{7} - \cos \frac{2\pi}{7} + \cos \frac{3\pi}{7} = \frac{1}{2}$.
6. Five students, A, B, C, D, E , took part in a contest. One prediction was that the contestants would finish in the order $ABCDE$. This prediction