Bank Soal Olimpiade Matematika SMA (III)
Summer Camp Persiapan OSN 2018
Departemen Matematika - Wardaya College

1. If it is known that the equation $x^4 + ax^3 + 2x^2 + bx + 1 = 0$ has a real root, prove the inequality $a^2 + b^2 \geq 8$.

2. Prove that if $a, b,$ and c are integers and both $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$ and $\frac{a}{c} + \frac{c}{b} + \frac{b}{a}$ are also integers, then $|a| = |b| = |c|$.

3. The two tangents to the incircle of a right-angled triangle ABC that are perpendicular to the hypotenuse AB intersect the hypotenuse a P and Q. Find angle PCQ.

4. Each of 17 students talk with every other student. They all talked about three different topics. Each pair of students talked about one topic. Prove that there are three students that talked about the same topic among themselves.