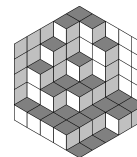




Junior Balkan MO 2009



- 1] Let $ABCDE$ be a convex pentagon such that $AB + CD = BC + DE$ and k a circle with center on side AE that touches the sides AB , BC , CD and DE at points P , Q , R and S (different from vertices of the pentagon) respectively. Prove that lines PS and AE are parallel.
- 2] Solve in non-negative integers the equation $2^a 3^b + 9 = c^2$
- 3] Let x, y, z be real numbers such that $0 < x, y, z < 1$ and $xyz = (1 - x)(1 - y)(1 - z)$. Show that at least one of the numbers $(1 - x)y, (1 - y)z, (1 - z)x$ is greater than or equal to $\frac{1}{4}$
- 4] Each one of 2009 distinct points in the plane is coloured in blue or red, so that on every blue-centered unit circle there are exactly two red points. Find the greatest possible number of blue points.