



PAMO 2019 Day 2

5 April 2019

Duration: 4 h 30 min

4. The tangents to the circumcircle of $\triangle ABC$ at B and C meet at D . The circumcircle of $\triangle BCD$ meets sides AC and AB again at E and F respectively. Let O be the circumcentre of $\triangle ABC$. Show that AO is perpendicular to EF .

(7 points)

5. A square is divided into N^2 equal smaller non-overlapping squares, where $N \geq 3$. We are given a broken line which passes through the centres of all the smaller squares (such a broken line may intersect itself).

- (a) Show that it is possible to find a broken line composed of 4 segments for $N = 3$.
(b) Find the minimum number of segments in this broken line for arbitrary N .

(7 points)

6. Find the 2019th strictly positive integer n such that $\binom{2n}{n}$ is not divisible by 5.

(7 points)

La version française se trouve de l'autre côté de la page.

(Total: 21 points)