PAMO Stream Test 3

April Camp 2019

Time: $4\frac{1}{2}$ hours

1. Find a non-zero polynomial $f(x, y)$ such that $f(\lfloor 3t \rfloor, \lfloor 5t \rfloor) = 0$ for every $t \in \mathbb{R}$.

2. Let ABC be a triangle and Γ be the circle of diameter $[AB]$. The bisectors of $\angle BAC$ and $\angle ABC$ cut the circle Γ again in D and E, respectively. The incircle of the triangle ABC cuts the lines BC and AC in F and G, respectively. Show that the points D, E, F and G lie on the same line.

3. A positive integer is called special if its digits can be arranged to form an integer divisible by 4. How many of the integers from 1 to 2018 are special?