2016 Kosovo Team Selection Test

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by dangerousliri

1 Solve equation in real numbers

$$\sqrt{x+\sqrt{4x+\sqrt{16x+\sqrt{\ldots+\sqrt{4^n x+3}}}}}-\sqrt{x}=1$$

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2 Show that for all positive integers $n \geq 2$ the last digit of the number $2^{2^n}+1$ is 7 .

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3 If quadratic equations $x^2+ax+b=0$ and $x^2+px+q=0$ share one similar root then find quadratic equation for which has roots of other roots of both quadratic equations .

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4 It is given the function $f:\mathbb{R}\to\mathbb{R}$ fow which $f(1)=1$ and for all $x\in\mathbb{R}$ satisfied

$f(x+5)\geq f(x)+5$ and $f(x+1)\leq f(x)+1$

If $g(x)=f(x)-x+1$ then find $g(2016)$.

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5 Let be ABC an acute triangle with $|AB|>|AC|$. Let be D point in side AB such that $\angle ACD=\angle CBD$. Let be E the midpoint of segment BD and S let be the circumcenter of triangle BCD . Show that points A, E, S and C lie on a circle .

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