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1 Find all triplets of nonnegative integers (x,y,z) and $x\leq y$ such that $x^2+y^2=3\cdot 2016^z+77$

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2 Find all monic polynomials P,Q which are non-constant, have real coefficients and they satisfy $2P(x)=Q(\frac{(x+1)^2}{2})-Q(\frac{(x-1)^2}{2})$ and $P(1)=1$ for all real x.

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3 ABC is an acute isosceles triangle $(AB=AC)$ and CD one altitude. Circle $C_2(C,CD)$ meets AC at K, AC produced at Z and circle $C_1(B,BD)$ at E. DZ meets circle (C_1) at M. Show that:
a) $\widehat{ZDE}=45^0$
b) Points E,M,K lie on a line.
c) $BM//EC$

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4 A square $ABCD$ is divided into n^2 equal small (fundamental) squares by drawing lines parallel to its sides.The vertices of the fundamental squares are called vertices of the grid.A rhombus is called *nice* when: • It is not a square • Its vertices are points of the grid • Its diagonals are parallel to the sides of the square $ABCD$

Find (as a function of n) the number of the *nice* rhombuses (n is a positive integer greater than 2).
