Flanders Math Olympiad 2008

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by parmenides51

1	Determine all natural numbers n of 4 digits whose quadruple minus the number formed by the digits of n in reverse order equals 30.
2	Let a, b and c be integers such that $a+b+c=0$. Prove that $\frac{1}{2}(a^4+b^4+c^4)$ is a perfect square.
3	A quadrilateral pyramid and a regular tetrahedron have edges that are all equal in length. They are glued together so that they have in common 1 equilateral triangle . Prove that the resulting body has exactly 5 sides.
4	A square with sides 1 and four circles of radius 1 considered each having a vertex of have the square as the center. Find area of the shaded part (see figure). `https://cdn.artofproblemsolving.com/attachments/b/6/6e28d94094d69bac13c2702853ac2c906a80a.png`