Junior Balkan Team Selection Test 2015

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1 Frog is in the origin of decartes coordinate system. Every second frog jumpes horizontally or vertically in some of the 4 adjacent points which coordinates are integers. Find number of different points in which frog can be found in 2015 seconds.

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2 Two different 3 digit numbers are picked and then for every of them is calculated sum of all 5 numbers which are getting when digits of picked number change place (etc. if one of the number is 707, the sum is $2401 = 770 + 77 + 77 + 770 + 707$). Do the given results must be different?

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3 Prove inequallity :

$$1 + \frac{1}{2^3} + ... + \frac{1}{2015^3} < \frac{5}{4}$$

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4 The diagonals AD, BE, CF of cyclic hexagon $ABCDEF$ intersect in S and AB is parallel to CF and lines DE and CF intersect each other in M. Let N be a point such that M is the midpoint of SN. Prove that circumcircle of $\triangle ADN$ is passing through midpoint of segment CF.
