SEVENTH GRADERS' FINAL ROUND IN HELSINKI 3.3.2012

(1) Compute

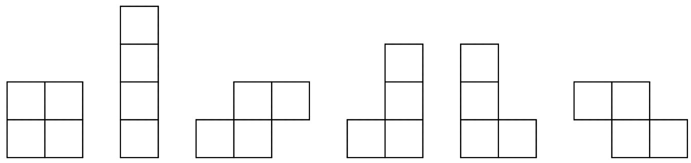
$$\frac{-2012}{1+(-2012)^2}+\ldots+\frac{-1}{1+(-1)^2}+\frac{0}{1+0^2}+\frac{1}{1+1^2}+\ldots+\frac{2012}{1+2012^2}.$$

(2) Find some numbers a, b and c for which the equation

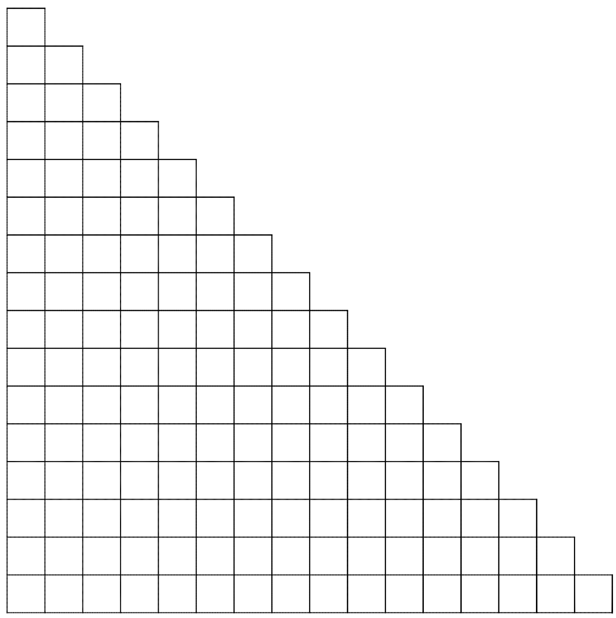
$$x^3+ax^2+bx+c=0$$

has the solutions $x=3$, $x=4$ and $x=5$. (Here $x^3=x\cdot x\cdot x$ and $x^2=x\cdot x$.)

(3) We have the following kinds of Tetris tiles at our disposal, an unlimited supply of each:



These may be rotated freely every which way. Is it possible to cover the following figure using these tiles in such a manner that no two tiles overlap, no tile is broken into smaller pieces and no tile extends beyond the boundary of the figure?



(4) What is the time in the precision of one second, when it is between one o'clock and two o'clock and the minute and hour hands are pointing exactly to the same direction?

(5) Which of the products $1\cdot 2011$, $2\cdot 2010$, $3\cdot 2009$, $\ldots$, $2010\cdot 2$ and $2011\cdot 1$ (all products of two positive integers, for which the sum of the factors is 2012) is the largest?