# Concursul Județean „DAN BARBILIAN" – Ediția a XXVI-a
# CURTEA DE ARGEŞ - 24 noiembrie 2012

Clasa a X-a ***Varianta 2***

## BAREM de CORECTARE şi NOTARE:

1. xy+xz+zx=$\frac{1}{2}[(x+y+z)^2-(x^2+y^2+z^2)]$...............................................2 p

Inegalitatea ceruta este echivalenta cu :

$2(\sqrt{x}+\sqrt{y}+\sqrt{z})+x^2+y^2+z^2\geq 9$ ..........................................................1 p

Se aplica inegalitatea mediilor...................................................................3 p

$x^2+2\sqrt{x}=x^2+\sqrt{x}+\sqrt{x}\geq 3x$

$y^2+2\sqrt{y}\geq 3y$

$z^2+2\sqrt{z}\geq 3z$

Finalizare..................................................................................................1 p

2. Inegalitatea mediilor :

m $\leq \sqrt[n]{a_1a_2\ldots a_n}$ .............................................................................2 p

$\log_{a_1} m \geq \frac{1}{n}(\log_{a_1} a_1+\log_{a_1} a_2+ \ldots\ldots + \log_{a_1} a_n)$.........................................2 p

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$\log_{a_n} m \geq \frac{1}{n}(\log_{a_n} a_1+\log_{a_n} a_2+ \ldots\ldots\ldots + \log_{a_n} a_n)$

$\log_{a_i} a_j > 0 \Rightarrow \log_{a_i} a_j+\log_{a_j} a_i \geq 2$, $\forall$ i, j $\in \{1,2,\ldots\ldots n\}$..............................1 p

Finalizare..................................................................................................2 p

3. Notam a + b =x

b + c =y

c +a =z

=> a = $\frac{x-y+z}{2}$ , b = $\frac{x+y-z}{2}$ , c = $\frac{-x+y+z}{2}$ ..................................................2 p

Daca x = y => a = c fals! => x ≠ y

Analog x ≠ z , y ≠ z ...............................................................................1 p

Din $y^3 = x^3$ si $z^3 = x^3$ => y = εx , z= $\varepsilon^2$x , $\varepsilon^3 = 1$, $\varepsilon^2 + \varepsilon + 1 = 0$.......................2 p

Se calculeaza $a^3 = \left(\frac{x-y+z}{2}\right)^3 = \frac{x^3}{8}(1 - \varepsilon + \varepsilon^2)^3 = -x^3$..............................0,5 p

Analog $b^3 = -x^3$.............................................................................0,5 p

$c^3 = -x^3$.............................................................................0,5 p

Finalizare ..................................................................................0,5 p

4. lg $2^{2009}$ = 2009 lg 2 =604,7.. => $2^{2009}$ are 605 cifre ....................................1 p

lg $2^{2010}$ =2010 lg 2 =605,01..=> $2^{2010}$ are 606 cifre......................................1 p

=> prima cifra a lui $2^{2010}$ este 1 ......................................................1 p

lg 5 = 1 - lg 2 =0,699 ..........................................................................1 p

lg $5^{2009}$ = 2009 lg 5 =1404,29.. => $5^{2009}$ are 1405 cifre .................................1 p

lg $5^{2010}$ = 2010 lg 5 =1404,99 => $5^{2010}$ are 1405 cifre .................................1 p

=> prima cifra a lui $5^{2009}$ este 1 ......................................................1 p