

## CONCURSUL DE MATEMATICĂ APLICATĂ „ADOLF HAIMOVICI”

Etapa locală – Constanța, 16.02.2013

filiera teoretică: profil umanist, toate specializările

Clasa a X-a

Barem de corectare și notare

**Subiectul 1**

$$\text{a) } \log_{54} 3 = \frac{1}{\log_3 54} = \frac{1}{\log_3 27 + \log_3 2} = \frac{1}{3+a} \dots\dots\dots (3\text{p})$$

$$\text{b) Conditii: } x - 2y > 0, x > 0, y > 0 \dots\dots\dots (1\text{p})$$

$$\lg(x - 2y)^2 = \lg xy \dots\dots\dots (1\text{p})$$

$$(x - 2y)^2 = xy \Rightarrow x^2 - 5xy + 4y^2 = 0 \Rightarrow \left(\frac{x}{y}\right)^2 - 5\left(\frac{x}{y}\right) + 4 = 0, \frac{x}{y} = t \dots\dots\dots (1\text{p})$$

$$t^2 - 5t + 4 = 0 \Rightarrow t_1 = 1 \Rightarrow \frac{x}{y} = 1 \text{ nu convine; } t_2 = 4 \Rightarrow \frac{x}{y} = 4 \dots\dots\dots (1\text{p})$$

**Subiectul 2**

$$\text{Calculam } \lg N = \lg\left(\frac{b}{c}\right)^{\lg a} + \lg\left(\frac{c}{a}\right)^{\lg b} + \lg\left(\frac{a}{b}\right)^{\lg c} \dots\dots\dots (2\text{p})$$

$$= \lg a(\lg b - \lg c) + \lg b(\lg c - \lg a) + \lg c(\lg a - \lg b) = \dots\dots\dots (2\text{p})$$

$$= \lg a \lg b - \lg a \lg c + \lg b \lg c - \lg b \lg a + \lg c \lg a - \lg c \lg b = 0 \dots\dots\dots (2\text{p})$$

$$\lg N = 0 \Rightarrow N = 10^0 = 1 \dots\dots\dots (1\text{p})$$

**Subiectul 3**

$$(\sqrt{3a-2}-2)(b-3)+0 \dots\dots\dots (2\text{p})$$

$$a = 2, b = 3 \dots\dots\dots (2\text{p})$$

$$2 - \sqrt{2 + \sqrt{3}} = \frac{1}{(2 + \sqrt{3})(2 + \sqrt{2 + \sqrt{3}})} \Leftrightarrow \dots\dots\dots (1\text{p})$$

$$\Leftrightarrow (4 - 2 - \sqrt{3})(2 + \sqrt{3}) = 1 \Leftrightarrow \dots\dots\dots (1\text{p})$$

$$\Leftrightarrow (2 - \sqrt{3})(2 + \sqrt{3}) = 1(A) \dots\dots\dots (1\text{p})$$

**Subiectul 4**

$$\text{a) } 2^x = 31; 31^y = 64 \Rightarrow 31^y = (2^x)^y = 2^{xy} = 64 \dots\dots\dots (2\text{p})$$

$$2^{xy} = 2^6 \Rightarrow xy = 6 \dots\dots\dots (1\text{p})$$

$$\text{b) } a = \frac{1}{\log_5 x^4} = \frac{1}{4 \log_5 x} \dots\dots\dots (2\text{p})$$

$$b = \frac{\log_5 125}{\log_5 x} = \frac{3}{\log_5 x} \dots\dots\dots (1\text{p})$$

$$\Rightarrow \frac{a}{b} = \frac{1}{12} \dots\dots\dots (1\text{p})$$