Simulare intermediară Bacalaureat – 01.02.2013
MATEMATICĂ
Proba E c) Subiectul I
specializarea ȘTIINȚELE NATURII

1. $i^{4k+1} = i$, $i^{4k+3} = -i$ 4p
   $i^{4k+1} + i^{4k+3} = 0$ 1p
   Suma are 1007 termeni 2p
   $i + i^3 + i^5 + \cdots + i^{2013} = i + 0 + 0 + \cdots + 0 = i$ 3p

2. $\log_2 2^n = n$ 2p
   $\log_2 3 < \log_2 2^n < \log_2 9 \Rightarrow 3 < 2^n < 9$ 4p
   $n \in \{2; 3\}$ 4p

3. $\sqrt{5-x} = x + 1$ 1p
   Condiții de existență : $\begin{cases} 5 - x \geq 0 \\ x + 1 \geq 0 \end{cases} \Rightarrow x \in [-1; 5]$ 3p
   $\left(\sqrt{5-x}\right)^2 = (x+1)^2$ 1p
   $x^2 + 3x - 4 = 0$ 2p
   $x_1 = 1 \in [-1; 5]$, $x_2 = -4 \notin [-1; 5]$ 3p

4. $2^{-x} = \frac{1}{2^x}$ 1p
   $2^x = t$, $t > 0$ 2p
   $t^2 + 5t - 14 = 0$ 2p
   $t_1 = 1$, $t_2 = -6 < 0$ 3p
   $t_1 = 1 \Rightarrow 2^x = 1 \Rightarrow x = 0$ 2p
5. $a = -2 \Rightarrow max\, f = y_V$ 2p
   $y_V = \frac{9+2a}{2}$ 3p
   $f(x) \leq \frac{1}{2}$, $\forall x \in \mathbb{R} \Rightarrow y_V \leq \frac{1}{2}$ 2p
   $a \leq -4$ 3p
6. $\sqrt[3]{n} \in \mathbb{Q} \Rightarrow n = a^3$, $a \in \mathbb{Q}$ 2p
   $n \in \{0; 1; 2^3; \ldots ; 12^3\}$ 4p
   $p = \frac{13}{2014}$ 4p
7. $\overrightarrow{OA}(2; -1) \Rightarrow A(2; -1)$, $\overrightarrow{OB}(1; 2) \Rightarrow B(1; 2)$ 2p
   M mijlocul lui AB $\Rightarrow M\left(\frac{3}{2}; \frac{1}{2}\right)$ 6p
   $\overrightarrow{OM}\left(\frac{3}{2}; \frac{1}{2}\right)$ 2p