

Concursul Național de Matematică Aplicată ” Adolf Haimovici ”,

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filiera tehnologica:

cl. a X-a

Varianta 3

Barem1.E =  $\lg \frac{n+1}{2}$  .....2p

a)  $\frac{n+1}{2} = 10$  .....1p

$n = 19$ .....1p

b)  $\lg \frac{n+1}{2} < 1$ .....1p

$\frac{n+1}{2} < 10$ .....1p

$n \in \{1,2 \dots 19\}$  .....1p

2.  $a < b \Leftrightarrow a^2 < b^2$ .....1p

Calculul  $a^2 = 29 + 6\sqrt{22}$ ,  $b^2 = 49\sqrt{11}$ .....2p.

$3\sqrt{22} > 10$  .....2p

Finalizare  $a > b$ .....2p.

3. a)  $(1 + i) \cdot (1 - i) = 2$ .....1p

$(1 + i)^2 = 2i$  .....1p

$\frac{1+i}{1-i} = i$ .....1p

b)  $\frac{(1+i)^{2018}}{(1-i)^{2011}} = \left(\frac{1+i}{1-i}\right)^{2011} \cdot (1+i)^2$  .....1p

$\frac{1+i}{1-i} = i$ .....1p

$i^{2011} = -i$ .....1p

$$\frac{(1+i)^{2019}}{(1-i)^{2011}} = 2 \dots\dots\dots 1p$$

4. a)  $z_C = -1, z_D = -i \dots\dots\dots 4p$

b)  $z_M = 1 + 2i, z_N = 2i + 1 \dots\dots\dots 3p$