

1. kolokvij iz Matematike

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Available time: 90 min. Dovoljena je uporaba dveh listov velikosti A4 z obrazci. Rezultati bodo objavljeni na uci lnica. fri. uni- lj. si.

Vse odgovore dobro utemelji!

1. Find all complex numbers z , that solve equation

$$z^2 + iz = -\bar{z} + i \operatorname{Re}(z).$$

Write all the solutions $x + iy$ in polar form $re^{i\phi}$.

2. Sequence with the general term (a_n)

$$a_n = \frac{4n^2 + 6}{25n^2}.$$

(a) Find the limit of this sequence $a = \lim_{n \rightarrow \infty} a_n$.

(b) Find the least index n , such that all further terms lie within the ε -neighbourhood of the limit a for $\varepsilon = \frac{1}{100}$?

3. For the function

$$f(x) = x^2 + 2x + 4$$

(a) find the tangent to its graph at the point $T(1, f(1))$,

(b) find both tangents which pass through the origin $(0, 0)$.

4. Let f be a real valued function

$$f(x) = \frac{x\sqrt{x}}{x^2 + 3}.$$

(a) Find the domain of definition for f .

(b) Calculate the derivative f' .

(c) Find the stationary points of f . Which stationary point is a local maximum?

(d) Does f in the local maximum attain its maximal value? (*Justify!*) What is this value?

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