



Analiza I - Temelji analize  
IZPIT - PRAKTIČNI DEL  
– 6. FEBRUAR, 2019 –

Čas: 80 minut. Največje možno število točk: 50. Pišite razločno. Vse odgovore je potrebno utemeljiti.

- (1) [14 t] Naj bosta  $f$  in  $g$  realni funkciji realne spremenljivke, ki sta podani s predpisoma

$$f(x) = \begin{cases} x-1 & ; \quad x < -1 \\ 2x+2 & ; \quad -1 \leq x \leq 1 \\ 3+x^2 & ; \quad x > 1 \end{cases}, \quad g(x) = \begin{cases} x^{-1} & ; \quad x < 0 \\ \sqrt{x+4} & ; \quad x \geq 0 \end{cases}$$

Določite inverz funkcije  $f$  in kompozitum  $f \circ g$ .

- (2) [12 t] V množici kompleksnih števil  $\mathbb{C}$  poiščite vse rešitve enačbe

$$(z-1)^4 = -1.$$

Rešitve zapišite v kartezični obliki  $x + iy$ , kjer sta  $x$  in  $y$  realni števili.

- (3) [12 t] Naj bo

$$A = \left\{ x \in \mathbb{R} \mid \sqrt{x+1} \leq \frac{|x+2|}{x-2} \right\}.$$

Določite tista izmed števil  $\min A$ ,  $\inf A$ ,  $\max A$  in  $\sup A$ , ki obstajajo.

- (4) Utemeljite, ali podana vrsta konvergira, ali ne:

(a) [6 t] 
$$\sum_{n=1}^{\infty} \frac{n!(n+1)}{(3n)!}$$

(b) [6 t] 
$$\sum_{n=1}^{\infty} \left( \frac{2^{n+1}}{2^n + 1} \right)^n$$

```
function quicksort(array)
  var list less, equal, greater
  if length(array) ≤ 1
    return array
  select a pivot value pivot from array
  for each x in array
    if x < pivot then append to less
    if x = pivot then append to equal
    if x > pivot then append to greater
  return concatenate(quicksort(list), equal, quicksort(greater))
```

University of Primorska

FAMNIT

Academic Year 2018/2019

## Analysis I

### FINAL EXAM - PRACTICAL PART

– FEBRUARY 6, 2019 –

Time: 80 minutes. Maximum number of points: 50. Please write clearly, and justify all your answers.

(1) [14 p] Let  $f$  and  $g$  be real functions of a real variable given by

$$f(x) = \begin{cases} x-1 & ; \quad x < -1 \\ 2x+2 & ; \quad -1 \leq x \leq 1 \\ 3+x^2 & ; \quad x > 1 \end{cases}, \quad g(x) = \begin{cases} x^{-1} & ; \quad x < 0 \\ \sqrt{x+4} & ; \quad x \geq 0 \end{cases}$$

Find the inverse of  $f$  and  $f \circ g$ .

(2) [12 p] Find all complex solutions of the equation

$$(z-1)^4 = -1.$$

Write solutions in Cartesian form  $x + iy$ , where  $x$  and  $y$  are real numbers.

(3) [12 p] Let

$$A = \left\{ x \in \mathbb{R} \mid \sqrt{x+1} \leq \frac{|x+2|}{x-2} \right\}.$$

Find  $\min A$ ,  $\inf A$ ,  $\max A$  in  $\sup A$ .

(4) Determine whether the series below converge or not:

(a) [6 p]  $\sum_{n=1}^{\infty} \frac{n!(n+1)}{(3n)!}$

(b) [6 p]  $\sum_{n=1}^{\infty} \left( \frac{2^{n+1}}{2^n + 1} \right)^n$