

Name:

Result:

Group A

**Zadanie 1.**

[6 punktów]

Calculate the following limits:

(a) 
$$\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^5 - 1}$$

(b) 
$$\lim_{x \rightarrow 3} \frac{x - 3}{\sqrt{x + 1} - \sqrt{3x - 5}}$$

(c) 
$$\lim_{x \rightarrow 5} \frac{\sqrt[3]{x + 3} - 2}{x - 5}$$

(d) 
$$\lim_{x \rightarrow -\infty} \frac{\sqrt{9x^2 + x + 11}}{1 - 2x}$$

(e) 
$$\lim_{x \rightarrow \infty} (\sqrt{x^2 + 3x} - \sqrt{x^2 + 3})$$

(f) 
$$\lim_{x \rightarrow 2^-} \frac{x + 3}{x^2 - 9x + 14}$$

**Zadanie 2.**

[2 punkty]

Find the values of parameters  $a$  and  $b$ , given that the function:

$$f(x) = \begin{cases} ax + b & \text{if } x < -1 \\ 2^x & \text{if } -1 \leq x \leq 2 \\ ax^2 + b & \text{if } x > 2 \end{cases}$$

is continuous.

**Zadanie 3.**

[2 punkty]

Prove that the equation:

$$x^4 + 12x + 3 = 2x^3 + 11x^2$$

has at least two solutions in the interval  $\langle -1, 2 \rangle$ .