

Introductory Mathematics - Test 1

WS 2016/2017

Each exercise for at most 10 points. You need to gain at least 55 points to pass the course. You are allowed to use written materials with formulas and tables of values, but you are not allowed to use calculators. Time: 80 minutes.

1) Solve the inequality

$$\frac{\frac{1}{3}x^2 - 1}{\frac{1}{9}|x|} > 3.$$

2) Solve the inequality

$$\tan(5x - 1) \leq \sqrt{3}$$

3) Determine the distance of point $A = \langle 2, -3 \rangle$ and line L , where L is defined by the following formula:

$$4y = -3x + 4.$$

4) Solve the following equation depending on the parameter $a \in \mathbb{R}$:

$$ax^2 + 2x - a + 2 = 0.$$

5) Sketch the graph of function f , where

$$f(x) = |e^{|x+2|} - e|.$$

Indicate important values, e.g. intersections with axes etc.

6) Simplify the following expression:

$$\sin\left(\frac{21}{4}\pi\right) \left(\log_4 2 + \log_{25} \frac{1}{\sqrt{5}}\right) \frac{x^2 y^3 + y^2 x^3}{x^2 + y^2 + 2yx} \cdot \frac{\sqrt[4]{x^3 y^5} + x^{\frac{3}{4}}}{x^{\frac{13}{4}}}.$$

7) Determine the domain of definition of

$$f(x) = \log\left(\sin(x) + \frac{1}{2}\right).$$

8) Solve the inequality

$$\frac{x-2}{x+3} \leq |x+1|.$$

9) Solve the following system of equations:

$$3x - 2y = 2,$$

$$5x + 3y = 1.$$

10) Find the inverse function to f including its domain, where

$$f(x) = e^{x^3 - 1}.$$