

**Analysis 2, Test 3 Part 2, 19. December 2019.**

**1. (6+6 points)** Give the following integrals :

i)  $\int \frac{\cotan(x) + \ln^6(\sin(x))}{\tan(x)} dx \quad (x \in (0; \pi/2)).$

ii)  $\int \frac{2x^2 - 10x + 4}{(x+1) \cdot (x^2 - 6x + 9)} dx \quad (x \in (-1; 3)).$

**2. (8 points)** Consider the curves given by the equations :

$$y = x^2; \quad y = 2x,$$

and the bounded region surrounded by them. The line  $y = 1$  divides it into two parts. Evaluate the area of these two parts.

**3. (6 points)** Rotate the graph of the function

$$f(x) = \frac{\sqrt{x}}{\cos x} \quad (x \in [0; \pi/4])$$

around the axis  $x$  and find the volume of the solid you get this way.

**4. (8 points)** Give the local extremum places and values for the function :

$$f(x, y) := x^3 + y^3 - 3x^2 + 6y^2 + 2 \quad ((x, y) \in \mathbb{R}^2).$$

**5. (6 points)** Evaluate the double integral of the function  $f(x, y) := \frac{8x}{y} \quad ((x, y) \in D)$ , where  $D$  is the bounded and closed region enclosed by the following curves :

$$y = x^2, \quad y = 3 - 2x, \quad y = 1/2.$$

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