MATHEMATICAL ANALYSIS 2

Test 1, version C.

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1. Write the general and the directional forms of equation of the tangent plane to the graph $z = f(x, y))$ of the function

$$f(x, y) = \frac{1}{\sqrt{1 + \operatorname{arctg}(x^2 y)}}$$

at the point $(x_0, y_0, z_0) = (1, 1, z_0)$.

2. Find and classify the critical points of the function $f(x, y) = x^3 + 3x^2 y - 6xy$.

3. Find the maximal and minimal values of the function $f(x, y) = x^2 + 2y^2$ under the constraint $g(x, y) = x^4 + y^4 - 1 = 0$. Indicate all the points where the maximal/minimal values are obtained.

4. * In the previous problem, find the the maximal and minimal values of the function $f(x, y)$ in the domain $D = \{(x, y) : g(x, y) \leqslant 0$.