

**QUIZ 6. ADVANCED MULTIVARIABLE CALCULUS,  
SPRING 2021**

1. (5 pts) Let

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

if  $(x, y) \neq (0, 0)$ , and  $f(0, 0) = 0$ . Is the function  $f$  differentiable at  $(0, 0)$ .

2. (5 pts) The sides of a triangle  $a = 2m$ ,  $b = 3m$ , and the angle between them is  $\theta = 60^\circ$ . Use linear approximation to estimate how much the third side  $c$  of the triangle changes when  $a, b, \theta$  increase by 2 cm, 5 cm and  $1^\circ$ , respectively.

3. (5 pts) Find the equation of the tangent hyperplane to the ellipsoid

$$x_1^2 + 2x_2^2 + \dots + nx_n^2 = n$$

at the point  $a = (1, \frac{1}{\sqrt{2}}, \dots, \frac{1}{\sqrt{n}})$ .