Math 53: Quiz #4

February 29

GSI: M. Lindsey

$\boxed{\text{20 points, 20 minutes}}$

Name: _____

Please give neat and organized answers. Whenever applicable (especially for computational questions), make it clear what strategy you are using. Points may be deducted for poor exposition.

Problem 1

(10 points.) Consider the surface given by $x^2 - y^2 + kz^2 = 1$. For what values of k does the surface contain a point where the tangent plane is parallel to the plane $z = x + y$? For these values of k, what is the point where this property holds? (Box your answers, please.)

(See back for next problem!)

Problem 2

(10 points.) Let $f(x, y) = (x^2 + y^2 - 1)^2$. Find all of the critical points of f. At which of the critical points does $D = f_{xx}f_{yy} - f_{xy}^2 = 0$? Classify the critical points as local minima, local maxima, or saddle points. (Box your answers, please.)

Critical points	
Critical points with $D = 0$	
Local minima	
Local maxima	
Saddle points	