MATH 311 – CALCULUS 3
Spring 2006
QUIZ 7

NAME_____

1. Find the rate of change of $f(x,y) = xy^2 + x^2y$ at the point $P(2,1)$ in the direction of $\langle 3, -4 \rangle$.

2. Think of the surface defined by $x^2 - y^2 + z^2 = 1$ as the level surface S of height 1 for the function $g(x,y,z) = x^2 - y^2 + z^2$. Find the equation of the tangent plane to S at the point $(2,2,-1)$.

3. Find all critical points of $h(x,y) = 2x^2 + y^3 - x^2y - 3y$.

4. The critical points of $k(x,y) = 4xy - x^4 - y^4 + 4$ are $(0,0)$ and $(1,1)$. If possible, use the Second Derivative Test to determine whether a saddle point or local extremum occurs at these critical points. In cases of local extrema, find and classify the local extreme value.