Name:_____

Math 2030, Winter 2011, Quiz 6
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No calculators needed or allowed.

Consider the surface $z = x^2y - x - y^2$.

1. Compute the partial derivatives

(2) • $z_x = \dfrac{\partial z}{\partial x}$

(2) • $z_y = \dfrac{\partial z}{\partial y}$

(3) 2. Find the equation of the tangent plane to the surface at $(x, y) = (2, 1)$.

(3) 3. Find the equation of the tangent line to the level curve which passes through $(x, y) = (2, 1)$.

Answers:

1. $\dfrac{\partial z}{\partial x} = 2xy - 1$ $\qquad$ $\dfrac{\partial z}{\partial y} = x^2 - 2y$

2. $z(2,1) = 4 - 2 - 1 = 1$

$z_x(2,1) = 4 - 1 = 3$ $\qquad$ $z_y(2,1) = 4 - 2 = 2$

Tangent plane is then

$z - 1 = 3(x-2) + 2(y-1)$ $\qquad$ $[\, dz = 3\,dx + 2\,dy \,]$

3. The level curve has $dz = 0$, so the tangent line to the level curve is

$0 = 3(x-2) + 2(y-1)$