Preparation Quiz 2, Math 2605-CS M1-M2, Fall 2012

Name: ________________________________

This quiz is to be taken without calculators and notes of any sorts. The allowed time is 20 minutes. Provide exact answers; not decimal approximations! For example, if you mean \( \sqrt{2} \) do not write 1.414...

Consider the function

\[ f(x, y) = 3 - x^2 + \frac{y^2}{4}. \]

1. (4 points) Find an equation for the tangent plane to the graph of \( z = f(x, y) \) at the point \( \overrightarrow{x}_0 = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \).

2. (3 points) Find the tangent line to the level curve of \( f \) that passes through the point \( \overrightarrow{x}_0 = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \). Give the line in parametric form.

3. (3 points) We start at the point \( \overrightarrow{x}_0 \) and move with velocity vector \( \overrightarrow{v} = \begin{bmatrix} 2 \\ 0 \end{bmatrix} \). What is the rate of change of \( z \)?
Extra Credit. (1 point) The tangent plane that you computed in problem 1 intersects the plane $z = 1$ in a line. Give the line in parametric form.