Math 200 Quiz #4 25 points Name:_____

1) Find the tangent plane, in ax + by + cz = d form, for the graph of $z = f(x,y) = x^2 y - \cos(xy)$ at $(1,0,-1)$ two different ways. (8 points)

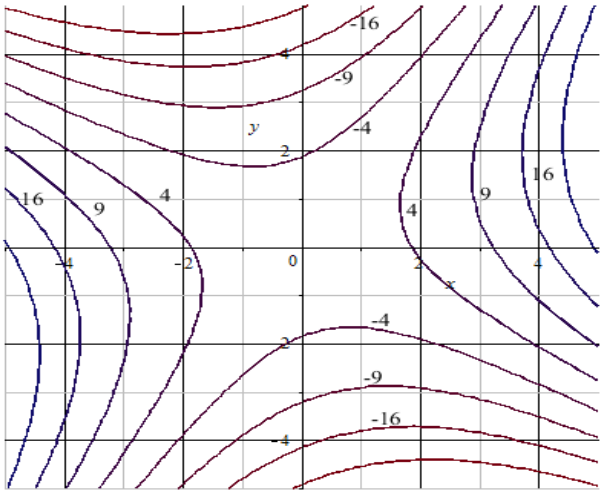
1A) Do not use the gradient of a new function.

1B) Use the gradient of a new function. Write the new function.

2) Find $\frac{\partial g}{\partial t}$ at t = 2 and w = 3 if $g(x,y) = \cos(xy)$, $x = x(t,w)$, with $x(2,3) = 1$, $x_t(2,3) = 2$, and $y = \frac{\pi t w}{4}$. (5 points)

3) Suppose $f(m,v)=\frac{1}{2}mv^2$ where m is measured with a 10% maximum percent error and v is measured with a 4% maximum percentage error. Use differentials to estimate the maximum percentage error of f(m, v) when m = 4 and v = 100. (4 points)

3) The contour map on the right is for z = f(x, y). Show work as you estimate the magnitude of $\nabla f(0.5,-3)$, and then sketch $\nabla f(0.5,-3)$ on the contour plot and (4 points)



4) Find the directional derivative of $g(x,y)=\sin(xy^2)$ for the input $P=(\pi,1)$ in the direction $\langle 4,3\rangle$. (4 points)