1. Let $f(x, y) = xy \sin x$. Compute the equation of the tangent plane to the surface defined by $f$ at the point where $(x, y) = \left( \frac{\pi}{2}, 5 \right)$. 

2. Let $f(x, y) = x^2 y^3$. What are the values of $f, f_x$ and $f_y$ at $(1, 2)$? Use these to approximate the value of $f(1.1, 1.9)$. 

3. Let $f(x, y) = (x - 2y)^2$. Compute the directional derivative of $f$, at the point $(3, 1)$, in the direction of the point $(4, 3)$. 

Calculus 10C, Winter 2015, Lecture B, Midterm 2

Please start each problem on a new page.
You will get full credit only if you show all your work clearly.
Simplify answers if you can, but don’t worry if you can’t!