1. A function of two variables $x, y$ is called linear if it is of the form $a + bx + cy$, where $a, b, c$ are constants. Find a linear function that best approximates the function $f(x, y) = \sqrt{2x + 3y}$ for points $(x, y)$ near $(2, 4)$. Then use your answer to approximate the value of $f(2.11, 3.87)$. (Calculator is not allowed in this problem.)

2. The plane $y = 1$ intersects the surface $z = xy + x^2 + y^2 + x$ in a curve. 
   (a) Show that $(2,1,9)$ is on this curve. (b) Find parametric equations for this curve. (c) Find parametric equations for the tangent line to this curve at $(2,1,9)$.

3. Let $z = x^2y + y^2x, x = \sin(2s), y = t + \cos(3t)$. Use Chain Rule to find $\frac{\partial z}{\partial t}$ at $s = \pi/4, t = \pi/6$. 