Supplementary Exercises for Sections 13.3

1. Explain in your own words why, when taking a partial derivative of a function of multiple variables, we can treat the variables not being differentiated as constants.

2. Consider a differentiable function, $f(x, y)$. Give physical interpretations of the meanings of $f_x(a, b)$ and $f_y(a, b)$ as they relate to the graph of f.

3. In much the same way that we used the tangent line to approximate the value of a function from single variable calculus, we can use the tangent plane to approximate a function from multivariable calculus. Consider the tangent plane found in Exercise 11. Use this plane to approximate $f(1.98, .4)$.

4. Suppose that one of your colleagues has calculated the partial derivatives of a given function, and reported to you that $f_x(x, y) = 2x + 3y$ and that $f_y(x, y) = 4x + 6y$. Do you believe them? Why or why not? If not, what answer might you have accepted for f_y?

5. Suppose f and g are single variable differentiable functions. Find the $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ in each case

   (a) $z = f(x)g(y)$

   (b) $z = f(xy)$

   (c) $z = f(x/y)$