

Math 211 Tangent Planes Practice

1. Find the equation of the tangent plane to $f(x, y) = 2 + 4x - 3y$ at the point $(1, 2)$. Simplify as much as possible. Does the result surprise you?
2. Find the equation of the tangent plane to $f(x, y) = x^2y$ at the point $(1, 2)$.
3. Find the linearization $L(x, y)$ for the function g defined by $g(x, y) = \frac{x}{x^2 + y^2}$ at the point $(1, 2)$. Then use the linearization to estimate the value of $g(0.8, 2.3)$.

4. The pressure, volume, and temperature of an ideal gas are related by the equation

$$P(T, V) = 8.31T/V, \text{ where } P \text{ is measured in kilopascals, } V \text{ in liters, and } T \text{ in kelvin.}$$

- a. Find the pressure when the volume is 12 liters and the temperature is 310 K.
- b. Use the linearization of $P(T, V)$ to estimate the change in the pressure when the volume increases to 12.3 liters and the temperature decreases to 305 K. How does this compare to the true value?