

**Partially Practicing**

1. Compute the partial derivatives of the following function.

(a)  $f(x, y) = 3x^5y - x^2y^2$

(b)  $g(x, y) = \arctan(y\sqrt{x})$

2. Consider the function  $f(x, y) = \begin{cases} \frac{x^3 - y^3}{x^2 + y^2}, & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$ .

(a) Explain why you cannot use the quotient rule to compute  $f_x(0, 0)$ .

(b) Compute  $f_x(0, 0)$  using the limit definition.