

Compute the following partial derivatives:

$$(1) \frac{\partial}{\partial x}(x^2y + 3xy^2 + \sin(x))$$

$$(2) \frac{\partial}{\partial x}(\tan(x^2y))$$

$$(3) \frac{\partial}{\partial y}(\cos(xy) \sin(xy^2))$$

$$(4) \frac{\partial}{\partial x} \left( \frac{x^2 + xy^3}{y \sin(x)} \right)$$

$$(5) \frac{\partial^2}{\partial x \partial y}(\sec(x^2y + xy^2))$$