

Problem statement Suppose $R(x, y) = v(x + y^2)$ where v is a four times differentiable function of *one* variable. Suppose you know also that:

$$v(0) = \alpha; v'(0) = \beta; v^{(2)}(0) = \gamma; v^{(3)}(0) = \delta; v^{(4)}(0) = \varepsilon.$$

Compute the following seven quantities in terms of α , β , γ , δ , and ε :

$$R(0, 0); \frac{\partial R}{\partial x}(0, 0); \frac{\partial R}{\partial y}(0, 0); \frac{\partial^2 R}{\partial x^2}(0, 0); \frac{\partial^2 R}{\partial y^2}(0, 0); \frac{\partial^2 R}{\partial x \partial y}(0, 0); \frac{\partial^4 R}{\partial x^2 \partial y^2}(0, 0).$$