Chapter 14. Partial Derivatives

14.10. Partial Derivative with Constrained Variables

Note. In finding partial derivatives of functions like $w = f(x, y)$, we have assumed x and y to be independent. In many applications, however, this is not the case.

Note. How to Find $\partial w/\partial x$ When the Variables in $w = f(x, y)$ Are Constrained by Another Equation. This process involves three steps. The steps are similar in finding $\partial w/\partial y$ and $\partial w/\partial z$.

1. *Decide* which variables are to be dependent and which are to be independent.

2. *Eliminate* the other dependent variable(s) in the expression for w.

3. *Differentiate* as usual.

If we cannot carry out Step 2 after deciding which variables are dependent, we differentiate the equations as they are and try to solve for $\partial w/\partial x$ afterward.

Examples. Page 846, numbers 2 and 10.