Second Derivative Test: Suppose the second partial derivatives of f are continuous on a disk with center (a, b) and suppose $\nabla f(a, b) = (0, 0)$. Let

$$D = D(a, b) = f_{xx}(a, b) f_{yy}(a, b) - f_{xy}(a, b)^2 \ .$$

(a) If $D > 0$ and $f_{xx}(a, b) > 0$, then (a, b) is a local minimum.

(b) If $D > 0$ and $f_{xx}(a, b) < 0$, then (a, b) is a local maximum.

(c) If $D < 0$, then (a, b) is a saddle point.