

Lecture on Jul. 7th, 2017: Applications of Partial Derivatives: Optimization I

1 Maxima and Minima

- Definitions of local maximum and local minimum for $z = f(x, y)$.
- Graphs of saddle point, local maximum and local minimum for $z = f(x, y)$.
- Second-order Partial Derivative Test for local extrema.
- Procedure to find local extrema for $z = f(x, y)$ (Chap 7.3).
- Example: Find local extrema for $z = f(x, y) = x^3 + y^2 - 6xy$. (Key: $(0, 0)$ is a saddle point; $f(6, 18)$ is a local minimum.)

2 Lagrange Multipliers

- Definition of the form of Maxima-Minima Problem.
- Procedure of method of Lagrange Multipliers (Chap 7.4).
- Example: Minimize $z = f(x, y) = x^2 + y^2$, subject to $g(x, y) = y - x + 2 = 0$. (method of Lagrange Multipliers and method of replacing y in $f(x, y)$ by x using the constraint).