

General Procedure for Lagrange Multipliers

- 1) Identify Objective function $f(\overbrace{x, y, z, \dots}^{n \text{ variables}})$ & constraints $\underbrace{g(x, y, z, \dots), h(x, y, z, \dots), \dots}_{m \text{ constraints}}$
 - 2) Build Lagrangian $L(\overbrace{x, y, z, \dots}^{n \text{ variables}}, \underbrace{\lambda, \mu, \dots}_{m \text{ constraints}})$ (called Lagrange Multipliers)
 $= f(x, y, z, \dots) - \lambda g(x, y, z, \dots) - \mu h(x, y, z, \dots) \dots$
 - 3) Take ALL partials of L ($n+m$ of them) and set them equal to $\emptyset$.
 - 4) Solve resulting $n+m$ systems of equations for variables $x, y, z, \dots$.
- Notes: a) Solve & remove Lagrange Multipliers ($\lambda, \mu, \dots$) first.
- b) You should ALWAYS recover constraint equations.
- 5) Plug solutions of 4) into objective function. Then use common sense to determine whether result is max/min.