Appendix A

The Lagrange multiplier method (reminder)

Extremum of a function $f(\underbrace{x_1, x_2, \ldots}_{\vec{x}})$ under the constraint $g(x_1, x_2, \ldots) = g_0$.

$$\widetilde{f}(\vec{x}) = f(\vec{x}) + \lambda g(\vec{x}) \tag{A.1}$$

$$\frac{\partial \widetilde{f}}{\partial \vec{x}} = \frac{\partial f}{\partial \vec{x}} + \lambda \frac{\partial g}{\partial \vec{x}} = 0 \tag{A.2}$$

- Add gradient of g, $\frac{\partial g}{\partial \vec{x}} \perp (g = \text{const. line})$ with weight factor λ such that $\frac{\partial \widetilde{f}}{\partial \vec{x}} \| (g = \text{const. line})$.
  $\rightarrow$ variation only along equipotential line

- The value of λ picks out the value g_0 to which g is fixed.

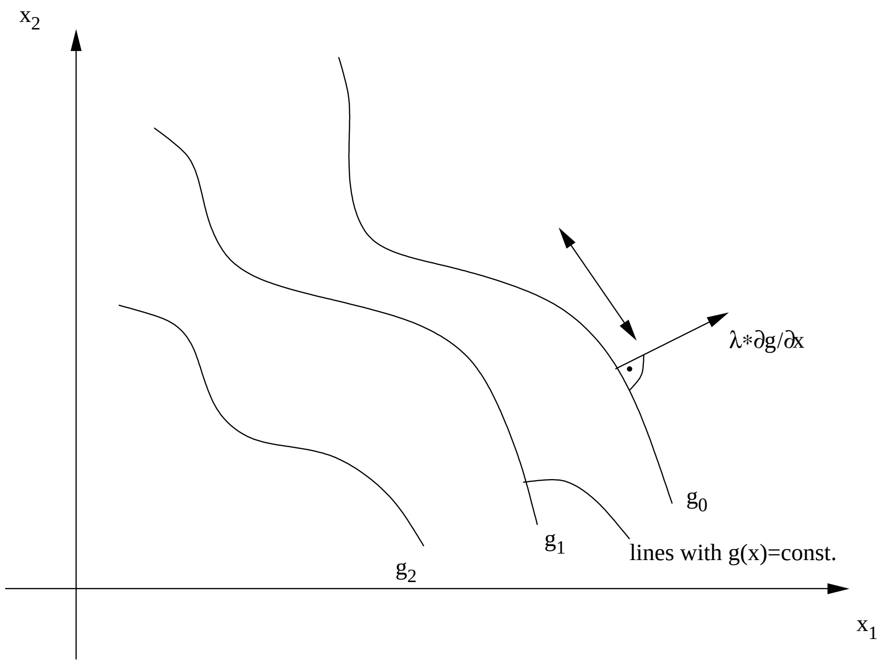

Figure A.1: Lagrange multiplier method

Appendix B

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