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|  | **Unconstrained Optimization** | **Constrained Optimization** |
| First Order Conditions |  | “balance of forces” |
| Feasibility | N.A. |  |
| Complementarity | N.A. | (“fence can only push in one direction”) and  which implies:  (“ball is on the fence”) OR  (“fence does not push against the ball”) |
| Constraint Qualification | N.A. | We will focus on LICQ and MFCQ |
| Second Order Conditions (SOC) | is P.S.D., i.e.,  for all | for all that satisfy1:  (strongly active2)  (inactive3 or weakly active4) |

1 SOC are vacuously satisfied if there are no search directions, i.e., no satisfies the three conditions involving and .

2 strongly active: and . “ball is touching the fence and the fence is pushing back against the ball”.

3 inactive: and . “ball is on the feasible side of the fence but is NOT touching the fence”

4 weakly active: and . “ball is BARELY touching the fence and the fence is NOT pushing back”