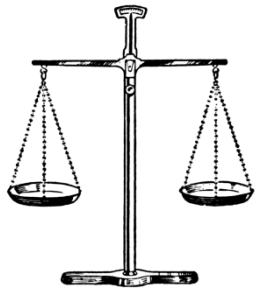
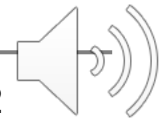


Non Linear Programming: introduction

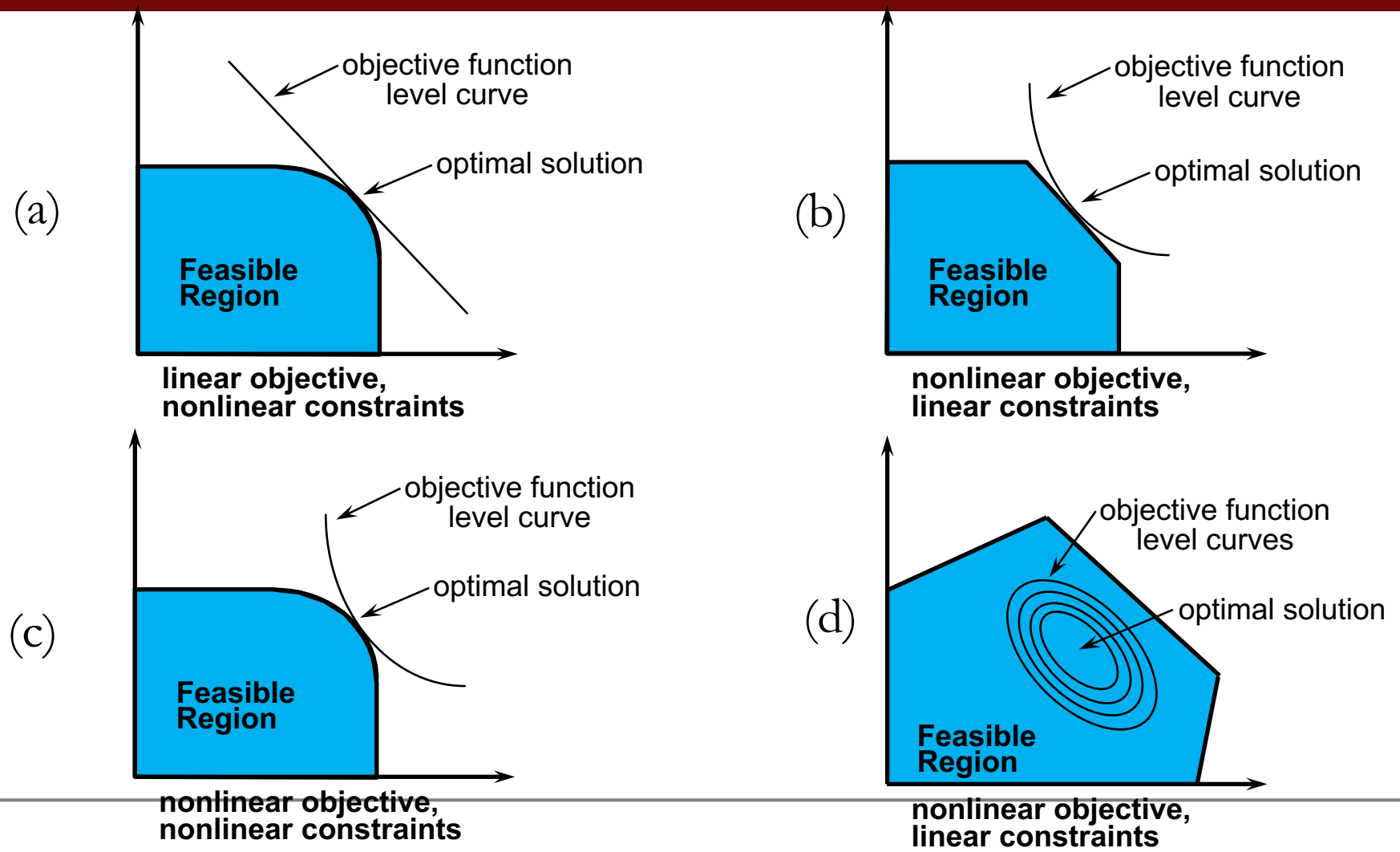
Introduction to Nonlinear Programming (NLP)

- An NLP problem has a nonlinear objective function and/or one or more nonlinear constraints.
- NLP problems are formulated and implemented in virtually the same way as linear problems.
- The mathematics involved in solving NLPs is quite different than for LPs.
- Solver tends to mask this different but it is important to understand the difficulties that may be encountered when solving NLPs.

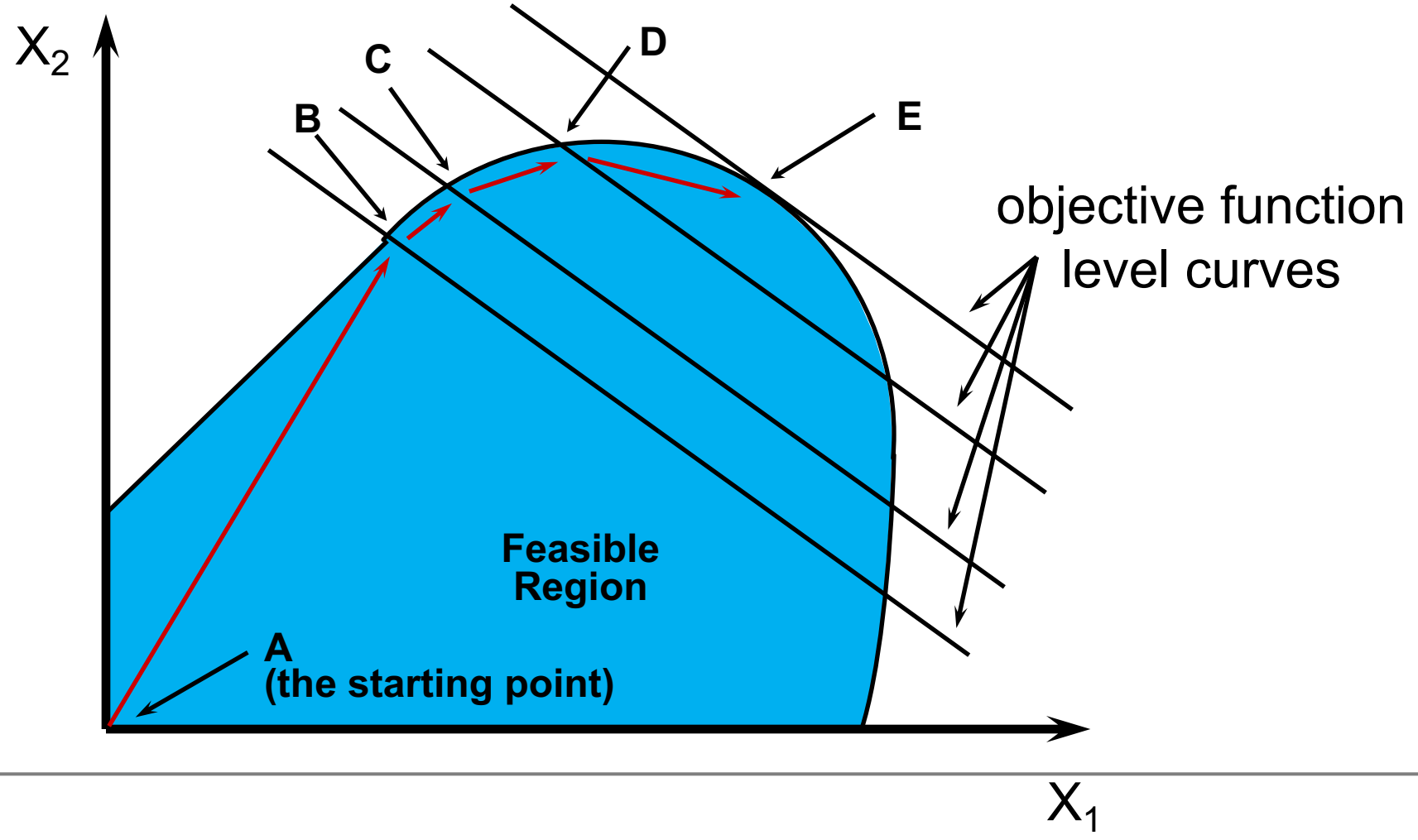


Possible Optimal Solutions to NLPs

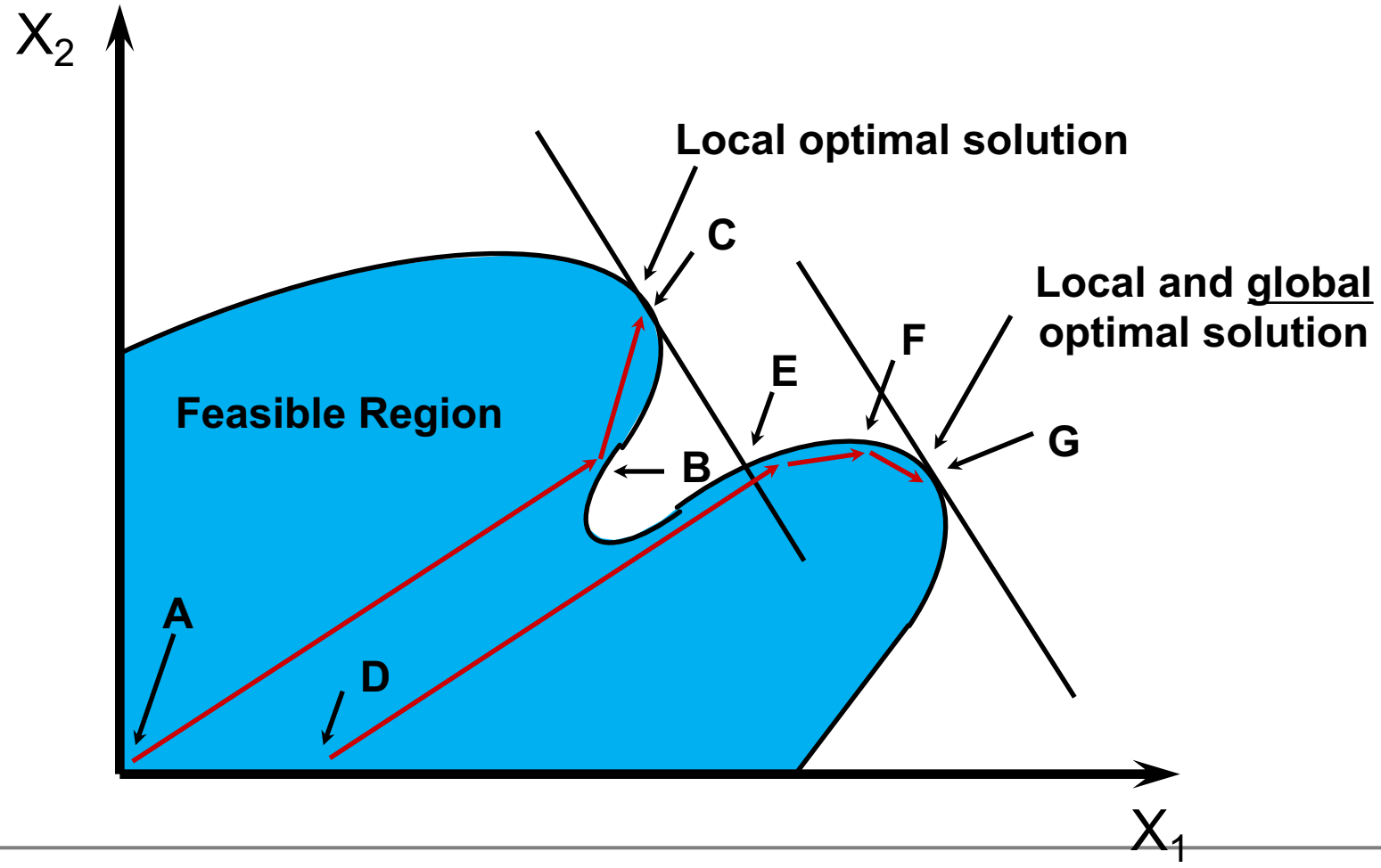
(not occurring at corner points)



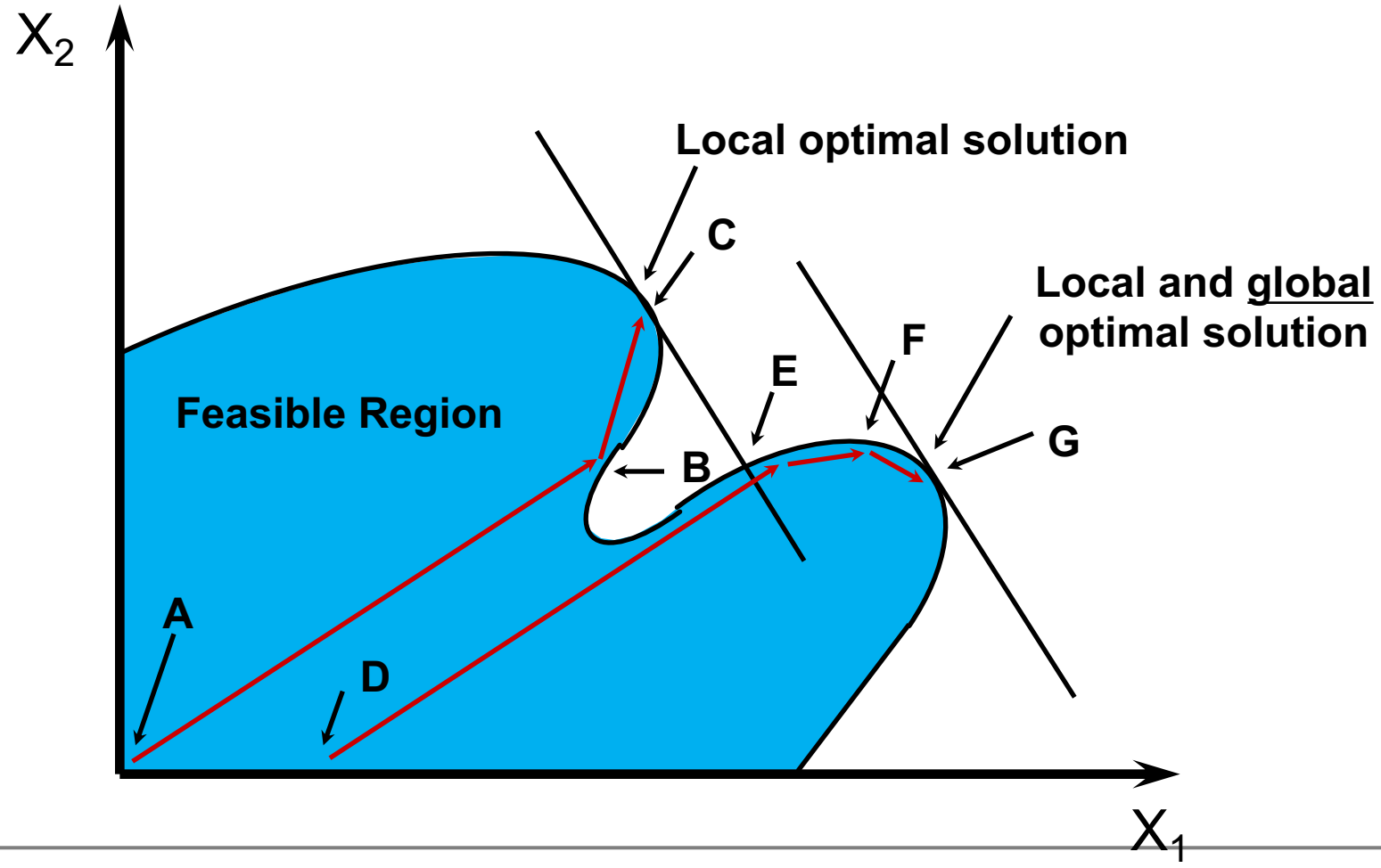
An NLP Solution Strategy



Local vs. Global Optimal Solutions

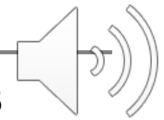


Local vs. Global Optimal Solutions



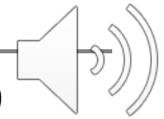
Comments About NLP Algorithms

- It is not always best to move in the direction producing the fastest rate of improvement in the objective.
- NLP algorithms can terminate at local optimal solutions.
- The starting point influences the local optimal solution obtained.



Comments About Starting Points

- The null starting point should be avoided.
- When possible, it is best to use starting values of approximately the same magnitude as the expected optimal values.



A Note About "Optimal" Solutions

This means that when a sw NLP solver finds a solution it means that it found a local optimal solution, but does not guarantee that the solution is the global optimal solution.