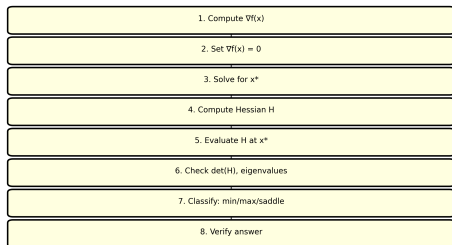
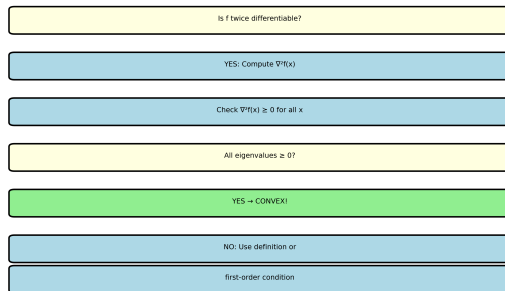


PROBLEM-SOLVING FLOWCHARTS

FINDING & CLASSIFYING CRITICAL POINTS



TESTING CONVEXITY



TESTING POSITIVE DEFINITENESS

Choose ONE method:

Method 1: Eigenvalues

Find all λ_i

All $\lambda_i > 0 \Rightarrow$ PD

Method 2: Sylvester

Compute minors M_1, M_2, \dots

All $M_i > 0 \Rightarrow$ PD

Method 3: Definition

Check $x^T A x > 0 \forall x \neq 0$

True? \Rightarrow PD

MATRIX MULTIPLICATION GUIDE

Matrix \times Matrix: AB

$(m \times n)(n \times p) = (m \times p)$

Row of A \cdot Column of B

Matrix \times Vector: Ax

$(m \times n)(n \times 1) = (m \times 1)$

Each row \cdot vector x

Vector^T \times Matrix: $x^T A$

$(1 \times n)(n \times m) = (1 \times m)$

Vector \cdot each column

Quadratic Form: $x^T A x$

$(1 \times n)(n \times n)(n \times 1) = \text{scalar}$