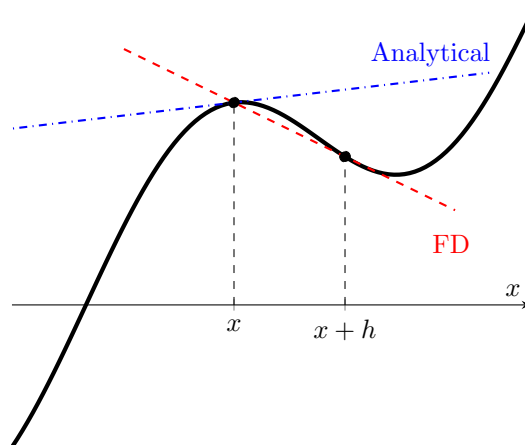# Playground

Abdelrahman

May 28, 2024

Figure 1: Forward Finite Difference
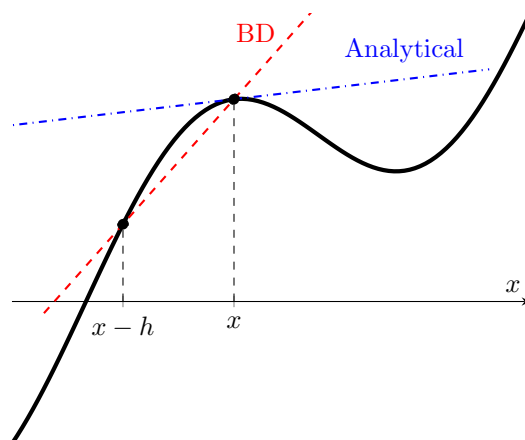

Figure 2: Backward Finite Difference
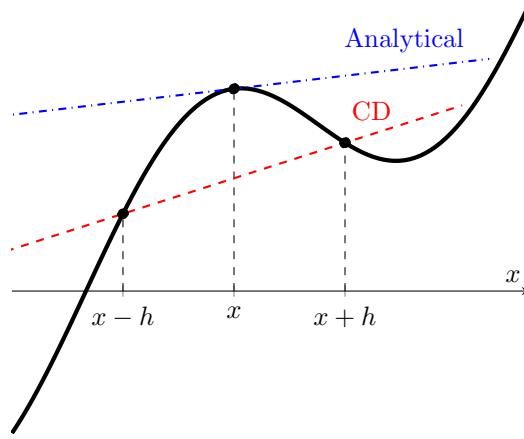
Figure 3: Central Finite Difference

Assumptions	
Steady & Fully developed $\Rightarrow$ 1	$\frac{\partial}{\partial t} = 0 \,, \quad \frac{\partial}{\partial x} = 0$
No-Slip Condition $\Rightarrow$ 2	$\mathbf{u}(x,0) = \mathbf{0} \,, \quad \mathbf{u}(x,d) = \begin{bmatrix} U \\ 0 \end{bmatrix}$
Constant Pressure $\Rightarrow$ 3	$\frac{\partial p}{\partial x} = 0 \,, \quad \frac{\partial p}{\partial y} = 0$
Newtonian Fluid	constant viscosity (ν)
Incompressible	constant density (ρ)
Laminar & Purely axial	$v = 0$

Assumptions	
Steady & Fully developed $\Rightarrow$ 1	$\frac{\partial}{\partial t} = 0 \,, \quad \frac{\partial}{\partial x} = 0$
No-Slip Condition $\Rightarrow$ 2	$\mathbf{u}(x,0) = \mathbf{0} \,, \quad \mathbf{u}(x,d) = \mathbf{0}$
Constant Pressure $\Rightarrow$ 3	$\frac{\partial p}{\partial x} = -G \,, \quad \frac{\partial p}{\partial y} = 0$
Newtonian Fluid	constant viscosity (ν)
Incompressible	constant density (ρ)
Laminar & Purely axial	$v = 0$

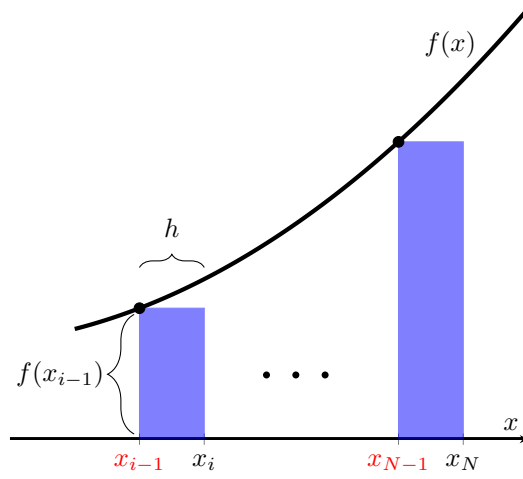| Assumptions	
Steady & Fully developed $\Rightarrow$ 1	$\frac{\partial}{\partial t} = 0 \,, \quad \frac{\partial}{\partial x} = 0$
No-Slip Condition $\Rightarrow$ 2	$\mathbf{u}(x,y,z) = \mathbf{0} \quad \Longleftrightarrow \quad \sqrt{y^2 + z^2} = R$
Constant Pressure $\Rightarrow$ 3	$\frac{\partial p}{\partial x} = -G \,, \quad \frac{\partial p}{\partial y} = 0 \,, \quad \frac{\partial p}{\partial z} = 0$
Newtonian Fluid	constant viscosity (ν)
Incompressible	constant density (ρ)
Laminar & Purely axial	$v = 0 \,, \quad w = 0$

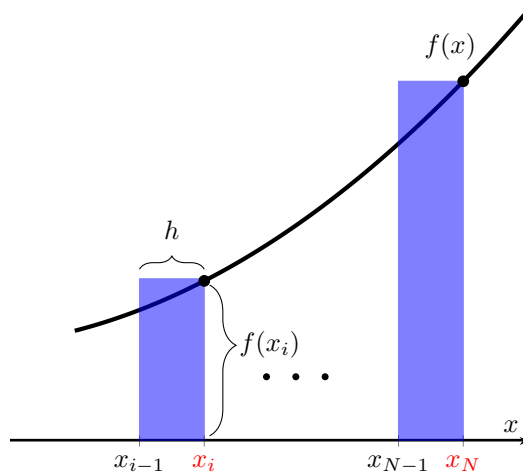Figure 4: Rectangle Method Left Point Rule

References

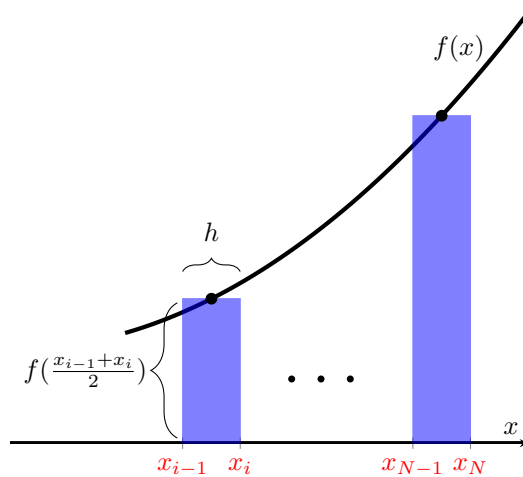Figure 5: Rectangle Method Right Point Rule

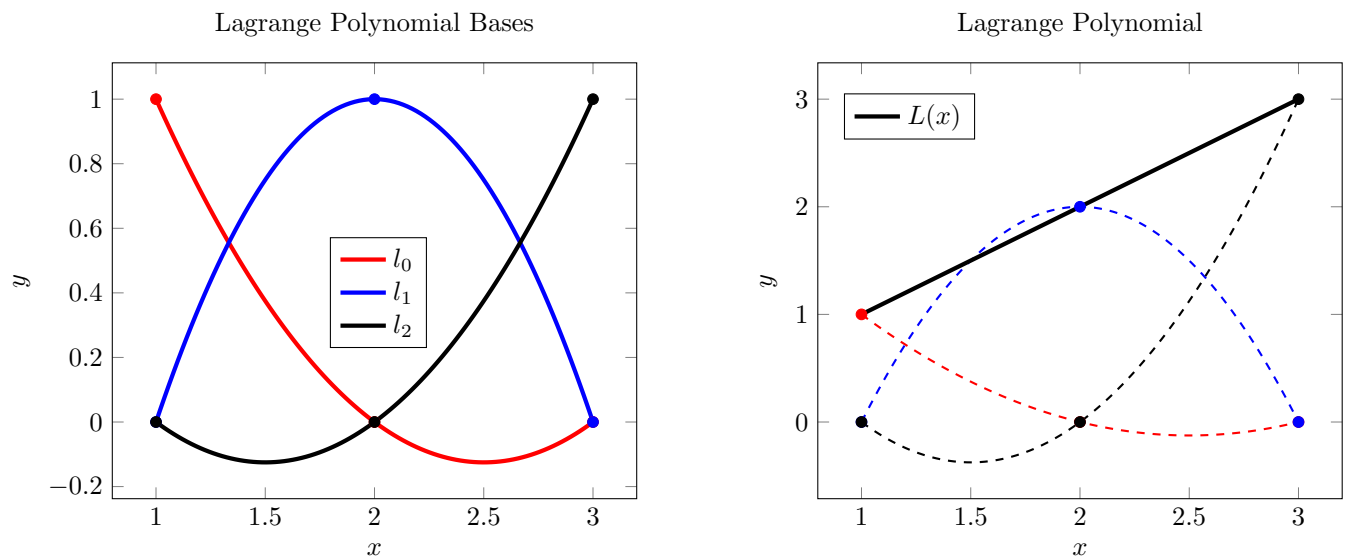Figure 6: Rectangle Method Midpoint Rule
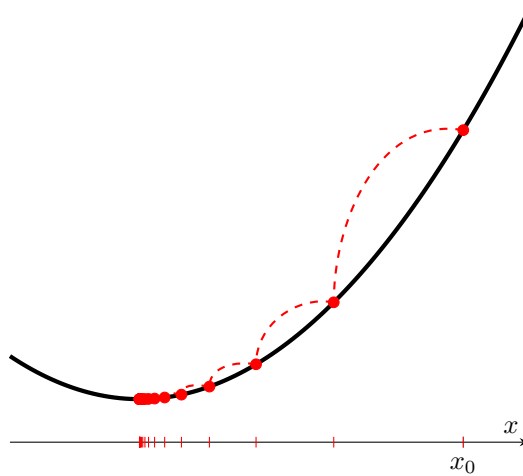
Figure 7: Lagrange Polynomial and its Bases

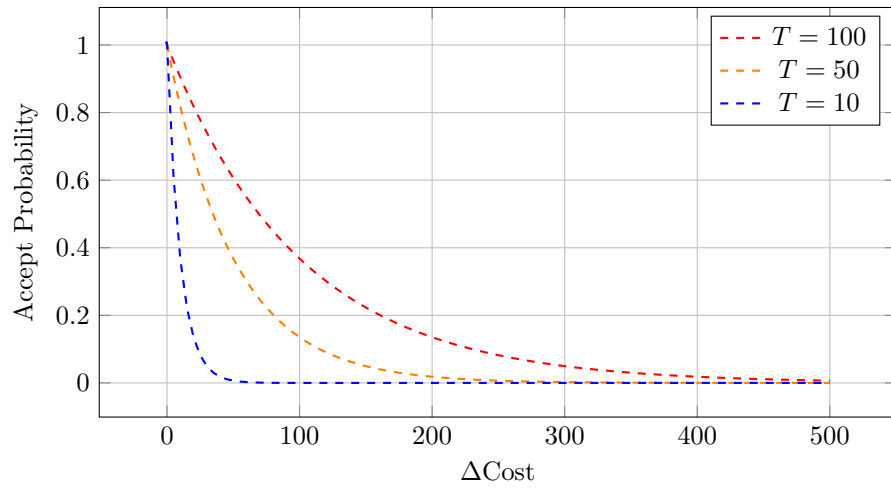Figure 8: Gradient Decent Steps

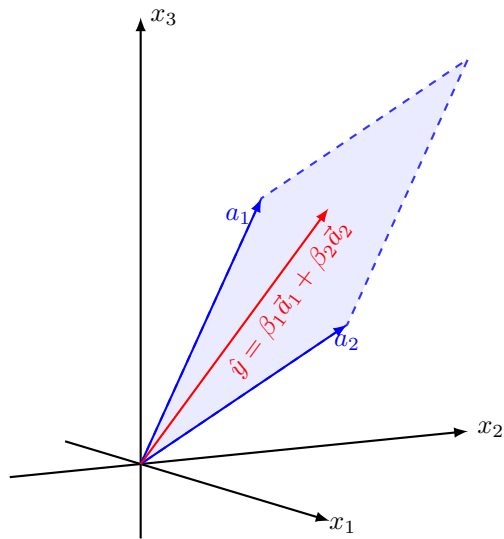Figure 9: Simulated Annealing Temperature

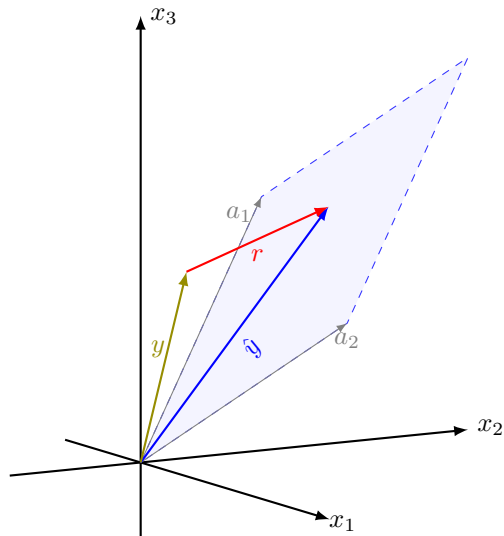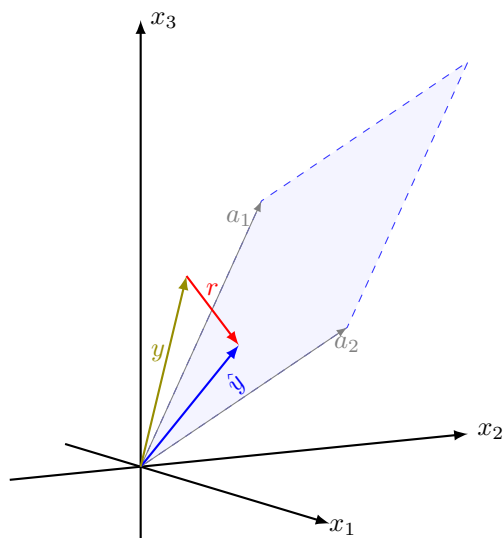Figure 10: Least Square Problem - Linear combination of column vectors

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Figure 11: Least Square Problem

Figure 12: Least Square Problem