|  |  |
| --- | --- |
| * Taylor series: | |
| * Bisection method: | * Secant Method: |
| * Newton’s method: | * Fixed point: , |
| * Regula falsi: and | |
| * LU two types Crout factorization [U] 1’s, Doolittle factorization [L] 1’s * Iterative Methods: Jacobi(previous iteration values), Gauss-Sidel(most updated values) * If matrix [a] is diagonally dominant, the iterative method converges.(aii is the max number), also it is well-conditioned. * condition number >>1 then ill-conditioned * error and residual  [r] = [b] – [a][] | |
| * Least square regression: , and | |
| * Polynomial Regression: where * Estimated Standard Error of Regression(mth-degree) , E = * R-squared, * Linearized Nonlinear Equations , , , | |
| * Two point forward Central | |
| * Three point forward: * Four point central: * 3 point central: 3 point forward: * 3 point backward: 4 point forward: * 4 point backward: * 5 point central: * Richardson’s extrapolation: , * Midpoint integration: * Trapezoidal integration: | |
| * Simpson’s 1/3 rule: | |
| * S’s 3/8 rule: | |
| * Gauss Quadrature:   For n=2,  For n=3, C1 = 0.5555556 C2 = 0.8888889 C3 = 0.5555556 X1 = -0.77459667 X2 = 0 X3 = 0.77459667  For n =4, CI = 0.3478548,C2 = 0.6521452,C3 = 0.6521452,C4 = 0.3478548, X1 = -0.86113631,X2 = -0.33998104,X3 = 0.33998104,X4 = 0.86113631  For n=5, CI = 0.2369269,C2 = 0.4786287,C3 = 0.5688889,C4 = 0.4786287,C5 = 0.2369269, X1 = -0.90617985,X2 = -0.53846931,X3 = 0,X4 = 0.53846931,X5 = 0.90617985 | |

* Euler Explicit: and Euler Implicit: and
* Euler midpoint: : and and
* Euler method truncation error at , Global ,

Local

* Improved Euler Midpoint ,
* Improved Euler Heun 1) Predictor: 2) Corrector:
* Runge-Kutta Methods where
* Modified Euler:

RK4 ,,,

* RK2 Heun’s method:
* RK2 Ralston’sMethod:
* Euler Stable problem: y’ = - y(0)=, if then Euler method is stable
* characteristic equation to get eigenvalues , power method:
* Norm for vector and matrix , matrix, get max after sum absolute value,