COMPARISON

**Non-Linear Equations:**

Bisection: Always converges, but is slow.

Newton-Raphson: More efficient than Bisection, but a derivate is required.

False-Position: Always converges, but can get stuck.

Secant Method: More efficient than Newton Method, but if the initial values are not close to the root, then it might not converge.

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| --- | --- | --- | --- | --- |
|  | **Bisection** | **Regular Falsi** | **Newton** | **Secant** |
| **Type** | Bracket | Bracket | Open | Open |
| **Num of Initial Guess** | 2 | 2 | 1 | 2 |
| **Rate of Convergence** | Slow but Steady | Slow | Faster | Faster |
| **Accuracy** | Great | Good | Good | Good |
| **Convergence** | Linear | Linear | Quadratic | Super Linear |
| **Method of Approach** | MidPoint | Interpolation | Taylor Series | Interpolation |
| **Prog Effect** | Easy | Tedious | Easy | Tedious |

**Ordinary Differential Equations:**

The 4 R-K Method gives the best approximate result as the error is very small as compared to Heun’s, Midpoint or Modified Euler. Heun’s method is slightly better than Midpoint Formula which is slightly better in approximation than Modified Euler.

As far as computation is concerned, the Midpoint formula is the easiest to compute, followed by Modified Euler and Heun’s Method. The 4-RK method requires most computation.