Comparison between Bracketing method and Open Method------

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| ***Comparison Topic*** | ***No*** | ***Bracketing Method*** | ***Open Method*** |
| **Initial Guess** | 1. | Two initial guesses **X*l*** and **X*u*** where *f(Xl)\*f(Xu)<0* | |  | | --- | | One initial guess **X**i | |
|  | 1. | ***xr = ( xl + xu )/2*** xr either replaces xl or xu according to the sign change of the function. The steps are repeated until εa< εs .  (Bisection Method) | |  | | --- | | ***Xi+1 = g(xi)*** where g(xi) is obtained after rearranging f(x) =0 so than x is on the left side and g(x) is on the right side. |   (Fixed point Iteration) |
| |  | | --- | | **Formula to compute Xr** | | 2. | ***f* (*xu* )(*xl*  *xu* )**  **Xr = xu –**  ***f* (*xl* ) *f* (*xu* )**   |  | | --- | | xr either replaces xl or xu according to the sign change of the function.The steps are repeated until εa< εs . |   (False Position Method) | |  | | --- | | ***Xi+1 = xi - f(xi) / f'(xi)*** |   (Standard Newton Raphson Method) |
| **Advantages** | 1. | |  | | --- | | Always Converges The approximate error can easily be estimated from the formula εa=|(Xu Xl)/(Xu+Xl)| |   (Bisection Method) | |  | | --- | | Simple Computations even using hand calculator. |   (Fixed point Iteration) |
|  | 2. | |  | | --- | | Always Converges. Converges faster than Bisection in most cases. |   (False Position Method) | |  | | --- | | Most commonly used method. When converges, It does faster than previous methods. |   (Standard Newton Raphson Method) |
|  | 1. | |  | | --- | | Slow Convergence compared with other methods |   (Bisection Method) | |  | | --- | | Only converges when |g'(x)|<1 |   (Fixed point Iteration) |
| |  | | --- | | **Disadvantages** | | 2. | |  | | --- | | Exhibits very slow convergence when function has significant curvature. |   (False Position Method) | |  | | --- | | The derivative *f'* is sometimes not easy to find and needs individually designed program code. In some cases it may diverge or Exhibit poor convergence. |   (Standard Newton Raphson Method) |
| |  | | --- | | **Cases where this method is unsuitable** | | 1. | |  | | --- | | Even Multiple roots. | | |  | | --- | | functions where the root lies on a reflection point. | |
|  | 2. | |  | | --- | | When function has significant curvature. | | |  | | --- | | When the tangent at xi has zero or near zero slop. | |