

Numerical Methods I

Quiz #1 Tips

Jonathan Henrique Maia de Moraes (ID: 1620855)

09/17/2015

Quiz #1

0.1 Absolute Error

$$e_{abs} = |e_{exact} - e_{approx}| \quad (1)$$

0.2 Relative Error

$$e_{rel} = \frac{|e_{exact} - e_{approx}|}{|e_{exact}|} \quad (2)$$

0.3 Bisection Method

$$m = \frac{b + a}{2} \quad (3)$$

If $y < 0$, $a = m$;
Else if $y > 0$, $b = m$;
Else $y = 0$.

0.4 Regula Falsi

$$x = b - y_b \frac{b - a}{y_b - y_a} \quad (4)$$

If $y < 0$, $a = x$;
Else if $y > 0$, $b = x$;
Else $y = 0$.

0.5 Secant Method

$$x_{n+1} = x_n - \frac{f(x_n) * (x_n - x_{n-1})}{f(x_n) - f(x_{n-1})} \quad (5)$$

0.6 Newton's Method

$$x_{n+1} = x_n - \frac{y(n)}{y'(n)} \quad (6)$$

0.7 Fixed-Point

$$f(p) = p \quad (7)$$

$$x = f(x) = 0 \quad (8)$$

Find a convenient $x = g(x)$, and use:

$$x_{n+1} = g(x_n) \quad (9)$$

0.8 Existence (Intermediate Value Theorem)

If y changes sign in $[a, b]$ and is continuous, exists at least one root in $[a, b]$.

0.9 Uniqueness (Monotone)

If y' does not change sign in $[a, b]$ and it is continuous, exists only one root in $[a, b]$.