Numerical Methods I
Homework Problem Set #3

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Quiz #1

0.1 Absolute Error

$$e_{abs} = |e_{exact} - e_{approx}| \tag{1}$$

0.2 Relative Error

$$e_{rel} = \frac{|e_{exact} - e_{approx}|}{|e_{exact}|} \tag{2}$$

0.3 Bisection Method

$$m = \frac{b+a}{2} \tag{3}$$

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

0.4 Regula Falsi

$$x = b - y_b \frac{b-a}{y_b - y_a} \tag{4}$$

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

0.5 Secant Method

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

0.6 Newton‘s Method

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

0.7 Fixed-Point

$$f(p) = p \tag{7}$$
$$x = f(x) = 0 \tag{8}$$

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

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

0.8 Existence (Intermediate Value Theorem)

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

0.9 Uniqueness (Monotone)

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