Ramos Hernández Antonio

3. Se la función

$$f(x) = \ln(x^2) = 0.7$$

- Determinar analíticamente la raíz

$\ln(x^2) = 0.7$

$x^2 = e^{0.7}$

$x_1 = \sqrt{e^{0.7}}$ $\qquad$ $x_2 = -\sqrt{e^{0.7}}$

$\underline{\underline{x_1 = 1.419067549}}$ $\qquad$ $\underline{\underline{x_2 = -1.419067549}}$

- Determinar las primeras tres iteraciones (a mano) utilizando Bisección en un intervalo $x \in [0.5, 2]$

$f(x) = \ln(x^2) = 0.7$ $\qquad$ $x_l = 0.5$ $\qquad$ $x_u = 2$

$f(x_l) = \ln((0.5)^2) - 0.7 = -2.086294361$

$f(x_u) = \ln((2)^2) - 0.7 = 0.6862943611$

$f(x_u) f(x_l) = (-2.086294361)(0.6862943611)$

$= -1.431812055 < 0$ Negativo

Si hay raiz en el intervalo

$$X_r = \frac{X_l + X_u}{2} = \frac{0.5 + 2}{2} = \frac{2.5}{2} = 1.25$$

$$f(x_r) = \ln((1.25)^2) - 0.7 = -0.2537128974$$

$f(x_l) = -2.0862944361$
$f(x_r) = -0.2537128974$ $\quad f(x_r) \cdot f(x_u) < 0$
$f(x_u) = 0.6862943611$

Iteración 1

$X_l' = 1.25, \quad X_r' = \quad , \quad X_u' = 2$

$$X_r' = \frac{1.25 + 2}{2} = \frac{3.25}{2} = 1.625$$

$f(x_l') = \ln((1.25)^2) - 0.7 = -0.2537128974$
$f(x_r') = \ln((1.625)^2) - 0.7 = 0.2710156316$
$f(x_u') = \ln((2)^2) - 0.7 = 0.6862943611$

$$f(x_l) f(x_r) < 0$$

$$\varepsilon_a = \left| \frac{1.625 - 1.25}{1.625} \right| = 0.2307692308$$

Iteración 2

$X_l^2 = 1.25$, $X_r^2 =$, $Xu^2 = 1.625$

$$x_r^2 = \frac{1.25 + 1.625}{2} = 1.4375$$

$f(x_l^2) = \ln((1.25)^2) - 0.7 = -0.2537128974$
$f(x_r^2) = \ln((1.4375)^2) - 0.7 = 0.02581098738$
$f(xu^2) = \ln((1.625)^2) - 0.7 = 0.2710156316$

$$f(xr^2) \cdot f(xu^2) < 0$$

$$\varepsilon_a = \left| \frac{1.4375 - 1.625}{1.4375} \right| = 0.1304347826$$

Iteración 3

$Xl^3 = 1.4375$, $X_r^3 =$ $Xu^3 = 1.625$

$$x_r^3 = \frac{1.4375 + 1.625}{2} = 1.53125$$

$f(x_l^3) = \ln((1.4375)^2) - 0.7 = 0.02581098738$
$f(x_r^3) = \ln((1.53125)^2) - 0.7 = 0.1521687906$
$f(xu^3) = \ln((1.625)^2) - 0.7 = 0.2710156316$

Ramos Hernández Antonio

Determinar las primeras tres iteraciones (a mano) utilizando falsa posición y el intervalo del punto anterior.

$f(x) = \ln(x^2) = 0.7$ $\quad X_l = 0.5 \quad X_u = 2$

$f(x) = 2\ln(x) - 0.7 = 0$

$f(x_l) = 2\ln(0.5) - 0.7 = -2.086294361$

$f(x_u) = 2\ln(2) - 0.7 = 0.6862943611$

$f(x_l) \cdot f(x_u) = (-2.086294361)(0.6862943611)$

$= -1.431812056 < 0$

$$X_r = \frac{f(x_l)X_u - f(x_u)X_l}{f(x_l) - f(x_u)}$$

$$X_r = \frac{(-2.086294361)(2) - (0.6862943611)(0.5)}{-2.086294361 - 0.6862943611}$$

$X_r = 1.628707448$

$f(x_r) = 2\ln(1.628707448) - 0.7$

$= 0.275573447$

$f(x_l) \cdot f(x_r) < 0$

Iteración 1

$x_l^1 = 0.5 \qquad x_r^1 = \qquad x_u^1 = 1.628707448$

$f(x_l) = 2\ln(0.5) - 0.7 = -2.086294361$

$f(x_u) = 2\ln(1.628707448) - 0.7 = 0.2755734471$

$$x_r^1 = \frac{(-2.08629)(1.62870) - (0.27557)(0.5)}{-2.08629 - 0.27557}$$

$x_r^1 = 1.49703$

$f(x_r) = 2\ln(1.49703) - 0.7 = 0.10696$

$f(x_l) \cdot f(x_r) < 0$

Iteración 2

$x_l^2 = 0.5 \qquad x_r^2 = \qquad x_u^2 = 1.49703$

$f(x_l^2) = 2\ln(0.5) - 0.7 = -2.086294361$

$f(x_u^2) = 2\ln(1.49703) = 0.80696$

$$x_r^2 = \frac{(-2.08629)(1.49703) - (0.80696)(0.5)}{-2.08629 - 0.80696}$$

$x_r^2 = 1.21894$

$f(x_r^2) = 2\ln(1.21894) - 0.7 = -0.30403$

$f(x_l^2) \cdot f(x_u^2) < 0$

TEMA

FECHA

Iteración 3

$x_l^3 = 1.21894$ $x_r^3 =$ $x_u^3 = 1.49703$

$f(x_l^3) = 2\ln(1.21894) - 0.7 = -0.30403$

$f(x_u^3) = 2\ln(1.49703) - 0.7 = 0.10696$

$$x^3 = \frac{(-0.30403)(1.49703) - (0.10696)(1.21894)}{-0.30403 - 0.10696}$$

$x^3 = 1.42465$

$f(x_r^3) = 2\ln(1.42465) - 0.7$

$= 0.00785233904035$

$f(x_l^3) \cdot f(x_r^3) < 0$