Problema 1

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1. Sea el sig polinomio

$f(x) = -0.5x^2 + 2.5x + 4.5$ $\quad a = -0.5 \quad b = 2.5 \quad c = 4.5$

• Determinar formula chicharronera $\quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{-2.5 \pm \sqrt{(2.5)^2 + 4(-0.5)(4.5)}}{2(-0.5)}$$

$$x = \frac{-2.5 \pm \sqrt{6.25 + 9}}{-1}$$

$$x = \frac{-2.5 \pm \sqrt{15.25}}{-1}$$

$$x = \frac{-2.5 \pm \sqrt{61/4}}{-1}$$

$$x_1 = \frac{-2.5 + \sqrt{61/4}}{-1} = \frac{-2.5 + 3.90512}{-1} = \frac{1.40512}{-1} = -1.40512$$

$$x_2 = \frac{-2.5 - \sqrt{61/4}}{-1} = \frac{-2.5 - 3.90512}{-1} = \frac{-6.40512}{-1} = +6.40512$$

• Metodo Bisección $\quad (f(x) = -0.5x^2 + 2.5x + 4.5$

6.40512

$xl = 5 \qquad xu = 7$

$fxl = -0.5(5)^2 + 2.5(5) + 4.5 = \cancel{-12.5 + 12.5} + 4.5 = 4.5$

$fxu = -0.5(7)^2 + 2.5(7) + 4.5 = -24.5 + 17.5 + 4.5 = -2.5$

$fxl \cdot fxu = -$ ∴ raiz se encuentra aqui

$xr = xl + xu/2 = 5 + 7/2 = 6$

$fxr = -0.5(6)^2 + 2.5(6) + 4.5 = -18 + 15 + 4.5 = 1.5$

$fxl \cdot fxr = +$

$fxu \cdot fxr = -$ ∴ raiz se encuentra aqui

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$xl = xv - 1 = 6$
$xv = 7$

$fxl = 1.5$

$fxv = -2.5$

$xr = 6 + 7/2 = 6.5$

$fxr = -0.5(6.5)^2 + 2.5(6.5) + 4.5 = -21.125 + 16.25 + 4.5 = -0.375$

$fxl \cdot fxr$ = negativo si hay raiz

$fxv \cdot fxr$ = positivo no hay raiz

$xl = 6$ $fxl = 1.5$
$xv = 6.5$ $fxv = -0.375$

$xr = 6.5 + 6/2 = 12.5/2 = 6.25$

$fxr = -0.5(6.25)^2 + 2.5(6.25) + 4.5 = 0.59375$

$fxl \cdot fxr$ = positivo no hay raiz

$fxv \cdot fxr$ = negativo ∴ si hay raiz

$xl = 6.25$ $fxl = -0.375$

$xv = 6.50$ $fxv = 0.59375$

$xr = 6.25 + 6.50/2 = 6.375$

$fxr = -0.5(6.375)^2 + 2.5(6.375) + 4.5 = 0.1171875$

$fxr \cdot fxl$ = negativo ∴ si hay raiz

$fxr \cdot fxv$ = positivo ∴ no hay raiz

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falsa posición

-1.504012

$xl = -2$ $xu = -1$

$fxu = -0.5(-1)^2 + 2.5(-1) + 4.5 = -0.5 - 2.5 + 4.5 = 1.5$

$fxl = -0.5(-2)^2 + 2.5(-2) + 4.5 = -2 - 5 + 4.5 = -2.5$

$fxl \cdot fxu$ = negativo ∴ si hay raiz

$xr = xu - \frac{F(xu)(x_l - xu)}{F(xl) - F(xu)} = -1 - \frac{(1.5)(-2-(-1))}{-2.5 - 1.5} = -1 - \frac{1.5}{-4} = -1 - 0.375$

$= -1.375$

$fxr = 0.5(-1.375)^2 + 2.5(-1.375) + 4.5 = 0.1171875$

$fxl \cdot fxr$ = negativo ∴ si hay raiz

$fxu \cdot fxr$ = positivo ∴ no hay raiz

$xu = -1.375$ $fxu = 0.1171875$

$xl = -2$ $fxl = -2.5$

$xr = -1.375 - \frac{0.1171875(-2-(-1.375))}{-2.5 - 0.1171875} = \frac{0.1171875(-0.625)}{-2.6171875} = -1.347014925$

$fxr = -0.5(-1.347014925)^2 + 2.5(-1.347014925) + 4.5 = 0.225238083$

$fxr \cdot fxl$ = negativo ∴ si hay raiz

$fxr \cdot fxu$ = positivo ∴ no hay raiz

$xu = -1.3470$ $fxu = 0.225238083$

$xl = -2.$ $fx_l = -2.5$

$xr = -1.3470 - \frac{(0.225238083)(-2-(-1.3470))}{-2.5 - 0.225238083} = -1.400969768$

$fxr = -0.5(-1.400969768)^2 + 2.5(-1.400969768) + 4.5 = 0.016217434$

$fxr \cdot fxl$ = negativo ∴ si hay raiz

$fxr \cdot fxu$ = positivo ∴ no hay raiz

Norma

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$xu = -1.400969768$ $\quad fxu = 0.016217434$

$xl = -2$ $\quad fxl = -2.5$

$$xr = -2.400969768 - \frac{0.016217434(-2-(-1.400969768))}{-2.5-0.016217434}$$

$$xr = -1.404830616$$

$$fxr = -0.5(-1.404830616)^2 + 2.5(-1.404830616) + 4.5 =$$

$$= 0.00114893$$

$fxr \cdot fxl =$ negativo $\therefore$ si hay raiz

$fxr \cdot fxu =$ positivo $\therefore$ no hay raiz

$xu = 1.404830616$ $\quad fxu = 0.00114893$

$xl = -2$ $\quad fxl = -2.5$

$$xr = -1.404830616 - \frac{0.00114893(-0.595169384)}{-2.50114893}$$

$$= -1.405104014$$

$$fxr = -0.5(-1.405104014)^2 + 2.5(-1.405104014) + 4.5 =$$

$$= 0.00008131\underline{9}$$

$fxr \cdot fxl =$ negativo $\therefore$ si hay raiz

$fxr \cdot fxu =$ positivo $\therefore$ no hay raiz

Norma

Problema 2

2. Se el sig polinomio

$$f(x) = 5x^3 - 5x^2 + 6x - 2$$

$$x \cdot (5x^2 - 5x + 6) - 2 \neq 0$$

$$\frac{5 \pm \sqrt{(-5)^2 - 4(5)(6)}}{2(-5)} = \frac{5 \pm \sqrt{25 - 120}}{-10}$$

$$\frac{5 \pm \sqrt{-95}}{-10}$$

$$x_1 = \frac{1}{10}(5 - i\sqrt{95})$$

$$x_2 = \frac{1}{10}(5 + i\sqrt{95})$$

Problema 3

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3. Sea la función

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

Analiticamente la raiz

$\ln(x^2) = 0.7$

$x^2 = e^{0.7}$

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

$x_1 = 1.419067549$ $\qquad$ $x_2 = -1.419067549$

Bisección

$f(x) = \ln(x^2) - 0.7$ $\qquad$ $xl = 0.5$ $\qquad$ $xu = 2$

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

$fxu = \ln((2)^2) - 0.7 = 0.6862943611$

$fxu \cdot fxl = -1.431812055 < 0$ $\qquad$ Si hay raiz

$x_r = xl + xu/2 = \frac{0.5+2}{2} = \frac{2.5}{2} = 1.25$

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

$fxl = -2.086294361$

$fxr = -0.2537128974$ $\qquad$ $fxr \cdot fxu < 0$

$fxu = 0.6862943611$

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Iteración 1

$x_l = 1.25$, $x_r' =$ $x_u' = 2$

$$x_r = \frac{1.25 + 2}{2} = \frac{3.25}{2} = 1.625$$

$fx_l = \ln((1.25)^2) - 0.7 = -0.2537178974$
$fx_r = \ln((1.625)^2) - 0.7 = 0.2710156316$
$fx_u = \ln((2)^2) - 0.7 = 0.6862943611$

$$fx_r \cdot fx_l < 0$$

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

Iteración 2

$x_l = 1.25$ $x_r =$ $x_u = 1.625$

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

$fx_l = \ln((1.25)^2) - 0.7 = -0.25371789$
$fx_r = \ln((1.4375)^2) - 0.7 = 0.02581098$
$fx_u = \ln((1.625)^2) - 0.7 = 0.27101563$

$$fx_r \cdot fx_u <$$

$$\varepsilon_a = \left| \frac{1.4375 - 1.625}{1.4375} \right| = 0.13043478$$

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Iteración 3

$xl = 1.4375$ $\quad xr =$ $\quad xu = 1.625$

$xr = \frac{xl + xu}{2} = 1.53125$

$fxl = \ln((1.4375)^2) - 0.7 = 0.02581098$
$fxr = \ln((1.53125)^2) - 0.7 = 0.15716879$
$fxu = \ln((1.625)^2) - 0.7 = 0.27101563$

Falsa posición

$f(x) = \ln(x^2) - 0.7$ $\quad xl = 0.5$ $\quad xu = 2$
$f(x) = 2\ln(x) - 0.7 = 0$

$fxl = 2\ln(0.5) - 0.7 = -2.086294361$
$fxu = 2\ln(2) - 0.7 = 0.6862943611$

$fxl \cdot fxu = -1.431812056 < 0$ si hay raíz

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

$xr = 1.628707448$

$fxr = 2\ln(1.628707448) - 0.7 = 0.2755734471$

$fxl \cdot fxr < 0$

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Iteración 1

$xl = 0.5$ $\quad xr =$ $\quad xu = 1.62870748$

$fxl = 2\ln(0.5) - 0.7 = -2.086294361$
$fxu = 2\ln(1.62870748) - 0.7 = 0.275573447$

$$xr = \frac{(-2.08629)(1.62870) - (0.27557)(0.5)}{-2.08629 - 0.27557}$$

$xr = 1.49703$

$fxr = 2\ln(1.49703) - 0.7 = 0.10696$

$fxl \cdot fxr < 0$

Iteración 2

$xl = 0.5$ $\quad xr =$ $\quad xu = 1.49703$

$fxl = 2\ln(0.5) - 0.7 = -2.086294361$
$fxu = 2\ln(1.49703) - 0.7 = 0.80696$

$$xr = \frac{(-2.08629)(1.49703) - (0.80696)(0.5)}{-2.08629 - 0.80696}$$

$xr = 1.21894$

$fxr = 2\ln(1.21894) - 0.7 = -0.30403$

$fxr \cdot fxu < 0$

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Iteración 3

$x_l = 1.21894$ $x_r =$ $x_u = 1.49703$

$fx_l = 2\ln(1.21894) - 0.7 = -0.30403$

$fx_u = 2\ln(1.49703) - 0.7 = 0.1696$

$$x_r = \frac{(-0.30403)(1.49703) - (0.10696)(1.21894)}{-0.30403 - 0.10696}$$

$x_r = 1.42465$

$fx_r = 2\ln(1.42465) - 0.7 = 0.0078523 3 9 0 3 5$

$fx_l \cdot fx_r < 0$

Problema 4

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4. Sea la función

$$x^{3.5} = 80$$

Forma analítica

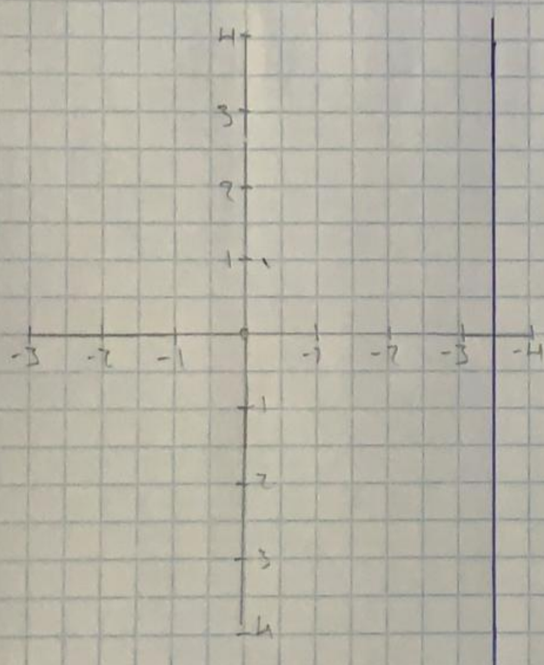
$(x)^{7/2} = 80$

$(\sqrt{x^7})^{2} = (80)^2$

$\sqrt[7]{\sqrt{x^7}} = 6400$

$x = 3.49736$

Forma Grafica



Bisección

$x^{3.5} - 80 = 0 \quad = f\, x^{7/2} - 80 = 0 \quad = f\, \sqrt{x^7} - 80 = 0$

$xl = 1$ $\qquad\qquad$ $xu = 3$

$fxl = \sqrt{(1)^7} - 80 = -79$

$fxu = \sqrt{(3)^7} - 80 = -33.23$

$fxl \cdot fxu =$ positivo $\therefore$ no hay raiz

no existe bisección ni falsa posición