TECNOLÓGICO DE ESTUDIOS SUPERIORES
DE ECATEPEC

División de ingeniería en Sistemas
Computacionales

"Examen"

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Grupo: 5501

Ejercicio 2

$$f(x) = (x-5)(x+1)^2 x(x-1)^3(x-2)^2$$

A) $[1, 2.5]$ Posible solución?

$f(xl) = (1-5)(1+1)^2(1)(1-1)^3(1-2)^2 = 0$

$f(xu) = (2.5-5)(2.5+1)^2(2.5)(2.5-1)^3(2.5-2)^2 = -64.5969$

B) $[-1.5, -3]$ No aplica este método

$f(xl) = (-1.5-5)(-1.5+1)^2(-1.5)(-1.5-1)^3(-1.5-2)^2 = -422.5527$

$f(xu) = (-3-5)(-3+1)^2(-3)(-3-1)^3(-3-2)^2 = -153600$

C) $[-1.75, 1.5]$ No aplica este método

$f(xl) = (-1.75-5)(-1.75+1)^2(-1.75)(-1.75-1)^3(-1.75-1)^2 = -1943.2333$

$f(xu) = (1.5-5)(1.5+1)^2(1.5)(1.5-1)^3(1.5-1)^2 = -1.02539$

D) $[-1.5, 1.75]$ No aplica este método

$f(xl) = (-1.5-5)(-1.5+1)^2(-1.5)(-1.5-1)^3(-1.5-1)^2 = -422.5527$

$f(xu) = (1.75-5)(1.75+1)^2(1.75)(1.75-1)^3(1.75-1)^2 = -1.13409$

Desarrolla el método de Bisección con 10 iteraciones
utilizando 5 decimales

$[1, 2.5]$

$xl = 1$ $f(xl) = 0$

$xr = \dfrac{xu + xl}{2} = 1.75$ $f(xr) = -1.13409$

$xu = -64.59690$

$[1, 1.02343]$

$xl = 1 \qquad f(xl) = 0$

$xr = 1.01171 \qquad f(xr) = -2.56675$

$xu = 1.02343 \qquad f(xu) = -0.00020$

$[1, 1.01171]$

$xl = 1 \qquad f(xl) = 0$

$xr = 1.00585 \qquad f(xr) = -3.21374$

$xu = 1.01171 \qquad f(xu) = -2.56675$

$[1, 1.00585]$

$xl = 1 \qquad f(xl) = 0$

$xr = 1.00292 \qquad f(xr) = -4.02630$

$xu = 1.00585 \qquad f(xu) = -3.21374$

$[1, 1.00292]$

$xl = 1 \qquad fxl = 0$

$xr = 1.00146 \qquad f(xr) = -5.02728$

$xu = 1.00292 \qquad f(xu) = -4.02030$

Nuevo intervalo [1, 1.75]

$xl = 1$ $f(xl) = 0$

$xr = 1.375$ $f(xr) = -0,57915$

$xu = 1.75$ $f(xu) = -1.13409$

[1, 1.375]

$xl = 1$ $f(xl) = 0$

$xr = 1.1875$ $f(xr) = -0,09427$

$xu = 1.375$ $f(xu) = -0.57915$

[1, 1.1875]

$xl = 1$ $f(xl) = 0$

$xr = 1.09375$ $f(xr) = -0,01267$

$xu = 1.1875$ $f(xu) = -0.09427$

[1, 1.09375]

$xl = 1$ $f(xl) = 0$

$xr = 1.04687$ $f(xr) = -0.00162$

$xu = 1.09375$ $f(xu) = -0.01267$

[1, 1.04687]

$xl = 1$ $f(xl) = 0$

$xr = 1.02343$ $f(xr) = -0.00020$

$xu = 1.04687$ $f(xr) = -0.00162$

Una vez que haya encontrado el o los intervalos, elija uno y desarrolle el m´etodo de la Biseccci´on con 10 iteraciones manuales, utilizando 5 decimales. Verificar sus resultados desarrollando un programa.

Intervalo

1

2.5

Criterio de paro: 0.00005

xl: 1.0 -> f(xl): -0.0

xr: 1.75 -> f(xr): -1.1340980529785156

xu: 2.5 -> f(xu): -64.599609375

Nuevo intervalo: 1.0   1.75

xl: 1.0 -> f(xl): -0.0

xr: 1.375 -> f(xr): -0.579150952398777

xu: 1.75 -> f(xu): -1.1340980529785156

Nuevo intervalo: 1.0   1.375

xl: 1.0 -> f(xl): -0.0

xr: 1.1875 -> f(xr): -0.0942736125580268

xu: 1.375 -> f(xu): -0.579150952398777

Nuevo intervalo: 1.0   1.1875

xl: 1.0 -> f(xl): -0.0

xr: 1.09375 -> f(xr): -0.012674697931203127

xu: 1.1875 -> f(xu): -0.0942736125580268

Nuevo intervalo: 1.0   1.09375

xl: 1.0 -> f(xl): -0.0

xr: 1.046875 -> f(xr): -0.001623389067613891

xu: 1.09375 -> f(xu): -0.012674697931203127

Nuevo intervalo: 1.0   1.046875

xl: 1.0 -> f(xl): -0.0

xr: 1.0234375 -> f(xr): -0.00020458918368336835

xu: 1.046875 -> f(xu): -0.0016223389067613891

Nuevo intervalo: 1.0   1.0234375

xl: 1.0 -> f(xl): -0.0

xr: 1.01171875 -> f(xr): -2.566758937716974e-05

xu: 1.0234375 -> f(xu): -0.00020458918368336835

Nuevo intervalo: 1.0   1.01171875

xl: 1.0 -> f(xl): -0.0

xr: 1.005859375 -> f(xr): -3.2137427405129024e-06

xu: 1.01171875 -> f(xu): -2.566758937716974e-05

Nuevo intervalo: 1.0   1.005859375

xl: 1.0 -> f(xl): -0.0

xr: 1.0029296875 -> f(xr): -4.0203063470555216e-07

xu: 1.005859375 -> f(xu): -3.2137427405129024e-06

Nuevo intervalo: 1.0   1.0029296875

xl: 1.0 -> f(xl): -0.0

xr: 1.00146484375 -> f(xr): -5.0272812942415987e-08

xu: 1.0029296875 -> f(xu): -4.0203063470555216e-07

Nuevo intervalo: 1.0   1.00146484375

xl: 1.0 -> f(xl): -0.0

xr: 1.000732421875 -> f(xr): -6.2852703983578685e-09

xu: 1.00146484375 -> f(xu): -5.0272812942415987e-08

Nuevo intervalo: 1.0   1.000732421875

xl: 1.0 -> f(xl): -0.0

xr: 1.0003662109375 -> f(xr): -7.857312954642725e-10

xu: 1.000732421875 -> f(xu): -6.2852703983578685e-09

Nuevo intervalo: 1.0   1.0003662109375

xl: 1.0 -> f(xl): -0.0

xr: 1.00018310546875 -> f(xr): -9.82209256251275e-11

xu: 1.0003662109375 -> f(xu): -7.857312954642725e-10

Nuevo intervalo: 1.0   1.00018310546875

xl: 1.0 -> f(xl): -0.0

xr: 1.000091552734375 -> f(xr): -1.227789726863281e-11

xu: 1.00018310546875 -> f(xu): -9.82209256251275e-11

Nuevo intervalo: 1.0   1.000091552734375

xl: 1.0 -> f(xl): -0.0

xr: 1.0000457763671875 -> f(xr): -1.5347547395385127e-12

xu: 1.000091552734375 -> f(xu): -1.227789726863281e-11

Nuevo intervalo: 1.0   1.0000457763671875

xr= 1.0000457763671875

Criterio de paro: 5e-05

Error aceptado: 4.5774271807625993e-05