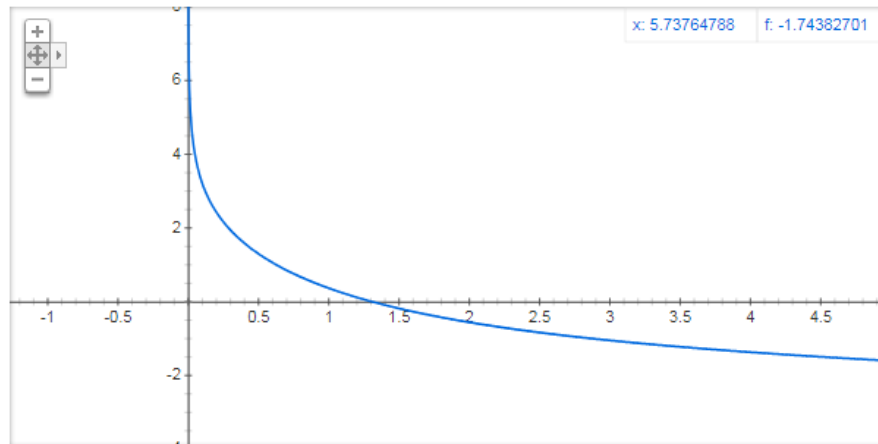


RECAPITULACIÓN

Función a analizar: $f(x) = e^{-x} - \ln(x)$

Gráfico de $e^{-x} - \ln(x)$



Lo revisaremos con los métodos vistos en clase, usando tolerancia de: $1 \cdot 10^{-8}$

Con Bisección:

```
options compilation execution
- B I S E C C I O N -
Digite el extremo inferior (a) : 1
Digite el extremo superior (b) : 2
Digite el numero de iteraciones : 100

n   Raiz      f(Raiz)      Er
2   1.25      0.06336124561  0.2
3   1.375    -0.06561413526  0.09090909091
4   1.3125   -0.002787366695  0.04761904762
5   1.28125  0.02985380711   0.0243902439
6   1.296875 0.01342726262   0.01204819277
7   1.3046875 0.005293741268  0.005988023952
8   1.30859375 0.001246670468  0.002985074627
9   1.310546875 -0.0007719729906  0.001490312966
10  1.309570312 0.0002369419798  0.0007457121551
11  1.310058594 -0.0002676171276  0.0003727171077
12  1.309814453 -1.536298788e-05  0.0001863932898
13  1.309692383 0.0001107831414  9.320533134e-05
14  1.309753418 4.770848827e-05  4.660049397e-05
15  1.309783936 1.617235308e-05  2.329970409e-05
16  1.309799194 4.045833266e-07  1.164971633e-05
17  1.309806824 -7.479227095e-06  5.824824236e-06
18  1.309803009 -3.537328089e-06  2.9124206e-06
19  1.309801102 -1.566373932e-06  1.456212421e-06
20  1.309800148 -5.808956905e-07  7.281067404e-07
21  1.309799671 -8.815627889e-08  3.640535028e-07
22  1.309799433 1.582134996e-07  1.820267845e-07
23  1.309799552 3.502860429e-08  9.101338397e-08
24  1.309799612 -2.65638388e-08  4.550668992e-08
25  1.309799582 4.232382389e-09  2.275334548e-08
26  1.309799597 -1.116572834e-08  1.137667261e-08
27  1.309799589 -3.466672949e-09  5.688336337e-09

Exit code: 1
```

Con Regla Falsa:

```
options compilation execution
- REGLA FALSA -
Digite el extremo inferior (Xi) : 1
Digite el extremo superior (Xs) : 2
Digite el numero de iteraciones : 100

XR : 1.397410482
n Raiz f(raiz) Er
1 1.321130513 -0.01165434668 0.05773840537
2 1.311269556 -0.001518072717 0.007520160038
3 1.309990366 -0.0001971266946 0.0009764885419
4 1.309824348 -2.558718367e-05 0.0001267483768
5 1.3098028 -3.321059888e-06 1.645115492e-05
6 1.309800003 -4.310503135e-07 2.135244538e-06
7 1.30979964 -5.594726205e-08 2.771395384e-07
8 1.309799593 -7.261555635e-09 3.597073487e-08
9 1.309799587 -9.424981351e-10 4.668744767e-09
Procedimiento completado satisfactoriamente
Exit code: 1
```

Con Newton:

```
options compilation execution
- NEWTON -
Digite la aproximacion inicial : 2
Digite el numero de iteraciones : 100

-- po -- -- p -- -- f(p) -- -- Er --
1 2 1.122019645 0.2104911739 0.782499984
2 1.122019645 1.294996971 0.0153903384 0.1335735365
3 1.294996971 1.309709063 9.35455524e-05 0.0112330995
4 1.309709063 1.309799582 3.494011969e-09 6.910962549e-05
5 1.309799582 1.309799586 1.665334537e-16 2.581500412e-09
Procedimiento completado satisfactoriamente
Exit code: 1
```

```
options compilation execution
- NEWTON -
Digite la aproximacion inicial : 10
Digite el numero de iteraciones : 100

-- po -- -- p -- -- f(p) -- -- Er --
1 10 -13.01494816 nan 1.768347279
2 -13.01494816 nan nan
3 nan nan nan nan
4 nan nan nan nan
5 nan nan nan nan
6 nan nan nan nan
7 nan nan nan nan
8 nan nan nan nan
9 nan nan nan nan
10 nan nan nan nan

95 nan nan nan nan
96 nan nan nan nan
97 nan nan nan nan
98 nan nan nan nan
99 nan nan nan nan
100 nan nan nan nan
El metodo fracaso despues de 100 iteraciones
Exit code: 0 (normal program termination)
```

Con Secante:

```
options compilation execution
- S E C A N T E -
Digite Xo : 1.5
Digite X1 : 2
Digite el numero de iteraciones : 100

XR : 1.257195551
n      Raiz      f(raiz)      Er
1      1.324487588  -0.01508646429
2      1.310118912  -0.0003299319151      0.01096745983
3      1.309797652  1.998641798e-06      0.0002452745986
4      1.309799586  -2.633402385e-10      1.476861141e-06
5      1.309799586  -3.330669074e-16      1.945649089e-10
Procedimiento completado satisfactoriamente
Exit code: 1
```

```
options compilation execution
- S E C A N T E -
Digite Xo : 8
Digite X1 : 10
Digite el numero de iteraciones : 100

XR : -10.61050396
n      Raiz      f(raiz)      Er
1      nan      nan      nan
2      nan      nan      nan
3      nan      nan      nan
4      nan      nan      nan
5      nan      nan      nan
6      nan      nan      nan

95     nan      nan      nan
96     nan      nan      nan
97     nan      nan      nan
98     nan      nan      nan
99     nan      nan      nan
100    nan      nan      nan
Exit code: 0 (normal program termination)
```

Con Müller:

```

options compilation execution
- M U L L E R -
Digite el valor X0 : 0.2
Digite el valor X1 : 0.9
Digite el valor X2 : 3.2
Digite el numero de iteraciones : 100

n      Raiz      f(raiz)      COTA DE ERROR
2      3.2      -1.122388606      0.2015792772
3      4.007912005      -1.370099111      1.772879302
4      1.445397209      -0.1327317144      0.1378704996
5      1.270265122      0.04153154071      0.03105302068
6      1.310974851      -0.001213871631      0.0008964267527
7      1.309800711      -1.162610448e-06      8.589707985e-07
8      1.309799586      -1.030331376e-11      7.612379059e-12
procedimiento completado satisfactoriamente

Exit code: 1

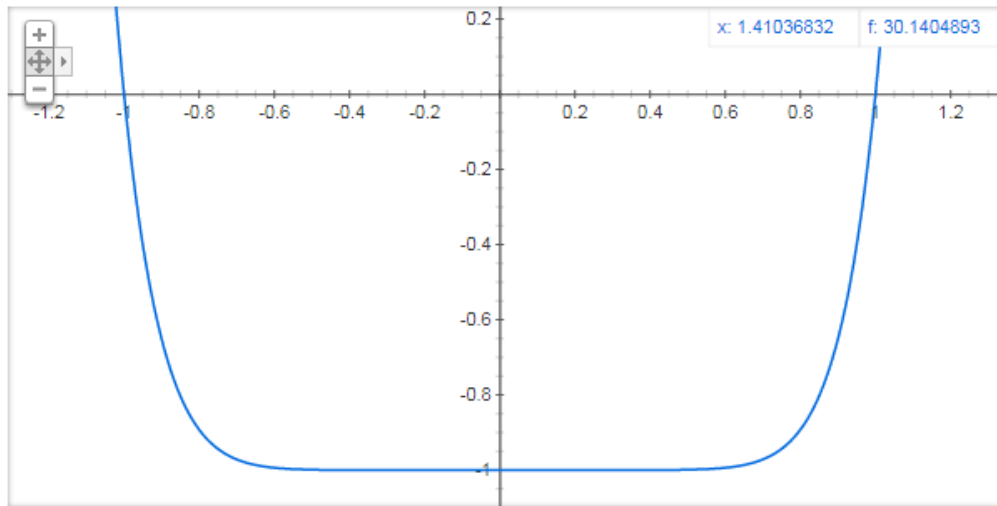
```

RESUMEN DE DESEMPEÑO DE LOS MÉTODOS PARA LA FUNCIÓN DADA en busca de la raíz

MÉTODO	Valor(es) Inicial(es)	Raíz	Iteraciones	Cota de Error
Bisección	[1, 2]	1.30979958	27	$5.68833633 \cdot 10^{-9}$
Regla Falsa	[1, 2]	1.30979958	9	$4.66874476 \cdot 10^{-9}$
Newton	Xo = 2	1.30979958	5	$2.58150041 \cdot 10^{-9}$
	Xo = 10	NO CONVERGE		
Secante	Xo = 1.5, X1 = 2	1.30979958	5	$1.94564908 \cdot 10^{-10}$
	Xo = 8, X1 = 10	NO CONVERGE		
Müller	Xo = 0.2 X1 = 0.9 X2 = 3.2	1.30979958	7	$7.61237905 \cdot 10^{-12}$

Función a analizar: $f(x) = x^{10} - 1$

Gráfico de $x^{10}-1$



Para hallar la raíz POSITIVA, lo revisaremos con los métodos vistos en clase, usando tolerancia de: $1 \cdot 10^{-8}$

Con Bisección:

```
options compilation execution
- B I S E C C I O N -
Digite el extremo inferior (a) : 0.8
Digite el extremo superior (b) : 1.3
Digite el numero de iteraciones : 100

n      Raiz      f(Raiz)      Er
2      0.925      -0.5414176586  0.1351351351
3      0.9875      -0.1181980742  0.06329113924
4      1.01875     0.2041378765   0.03067484663
5      1.003125     0.03169313534  0.01557632399
6      0.9953125    -0.04589848927  0.007849293564
7      0.99921875   -0.007785091322  0.003909304144
8      1.001171875  0.01178074161   0.001950838861
9      1.000195313  0.001954842508  0.0009763718024
10     0.9997070313  -0.002925828135  0.0004884243431
11     0.9999511719  -0.0004881739756  0.0002441525465
12     1.000073242  0.000732663321   0.0001220613725
13     1.000012207  0.0001220770182  6.10344112e-05
14     0.9999816895  -0.0001830903821  3.051813693e-05
15     0.9999969482  -3.051715903e-05  1.525883563e-05
16     1.000004578  4.577731016e-05  7.629359607e-06
17     1.000000763  7.629420725e-06  3.814694355e-06
18     0.9999988556  -1.144403286e-05  1.907350816e-06
19     0.9999998093  -1.907346995e-06  9.536744983e-07
20     1.000000286  2.861026633e-06  4.768370218e-07
21     1.000000048  4.76837261e-07  2.384185677e-07
22     0.9999999285  -7.152555066e-07  1.192092981e-07
23     0.9999999881  -1.192092827e-07  5.960464549e-08
24     1.000000018  1.788139492e-07  2.980232185e-08
25     1.000000003  2.980232328e-08  1.490116115e-08
26     0.9999999955  -4.470348225e-08  7.45058063e-09

Exit code: 1
```

Con Regla Falsa:

```
options compilation execution
- R E G L A   F A L S A -
Digite el extremo inferior (Xi) : 0.8
Digite el extremo superior (Xs) : 1.3
Digite el numero de iteraciones : 100

XR : 0.83262885
n   Raiz          f(raiz)          Er
1   0.861436448   -0.7749741394    0.0334413503
2   0.8864994846 -0.7002322733    0.02827191333
3   0.9079695022  -0.6191862576    0.02364618803
4   0.9260776152  -0.5360471283    0.01955355871
5   0.9411235228  -0.4549124225    0.01598717618
6   0.9534534304  -0.3791383193    0.01293184045
7   0.963433621   -0.3110019731    0.01035898098
8   0.9714258327  -0.2516642674    0.008227300015
9   0.9777683287  -0.2013441859    0.006486706336
10  0.9827639788  -0.1595878948    0.005083265344
11  0.9866747799  -0.1255393437    0.003963617109
12  0.9897212874  -0.0981607896    0.003078146927
13  0.9920852411  -0.07638731604   0.002382813121
14  0.9939139108  -0.05922083604   0.001839867284
15  0.9953250883  -0.04577781131   0.00141780564
16  0.9964120394  -0.03530580839   0.001090865045
17  0.9972480342  -0.02718134824   0.0008383017358
18  0.9978902871  -0.0208979617    0.0006436107805
19  0.9983832676  -0.01605020717   0.0004937788548
20  0.9987614155  -0.01231703821   0.000378616823
21  0.9990513295  -0.009446308505  0.0002901892623
22  0.9992735091  -0.007241204303  0.0002223411563
23  0.9994437277  -0.005548818724  0.0001703133425
24  0.9995741069  -0.004250777753  0.0001304347538
25  0.9996739532  -0.00325568853   9.987882958e-05
26  0.9997504064  -0.002493134611  7.647229272e-05
27  0.9998089412  -0.001908946607  5.854595395e-05

28  0.9998537534  -0.001461503458  4.481884284e-05
29  0.9998880581  -0.001118854881  3.430853432e-05
30  0.9999143178  -0.0008564915007 2.626193192e-05
31  0.9999344185  -0.0006556219841 2.010194805e-05
32  0.9999498042  -0.0005018449176 1.538649306e-05
33  0.9999615807  -0.0003841267115 1.177696833e-05
34  0.9999705945  -0.0002940160457 9.014082388e-06
35  0.9999774936  -0.000225040708  6.89930055e-06
36  0.9999827742  -0.0001722448261 5.280623208e-06
37  0.9999868158  -0.0001318340197 4.041686969e-06
38  0.9999899092  -0.0001009034234 3.093414818e-06
39  0.9999922768  -7.7229298e-05  2.367620616e-06
40  0.9999940889  -5.910940305e-05 1.812111384e-06
41  0.9999954758  -4.524074609e-05 1.386937098e-06
42  0.9999965373  -3.462596995e-05 1.061519441e-06
43  0.9999973498  -2.650167812e-05 8.124536845e-07
44  0.9999979716  -2.028356175e-05 6.218259892e-07
45  0.9999984475  -1.552439255e-05 4.759253276e-07
46  0.9999988118  -1.188186658e-05 3.642575224e-07
47  0.9999990906  -9.093989858e-06 2.787905574e-07
48  0.999999304  -6.960237506e-06 2.133769252e-07
49  0.9999994673  -5.327132513e-06 1.633114893e-07
50  0.9999995923  -4.077207585e-06 1.249930728e-07
51  0.9999996879  -3.12055655e-06  9.566544322e-08
52  0.9999997612  -2.388367881e-06 7.321906587e-08
53  0.9999998172  -1.827975348e-06 5.603936984e-08
54  0.9999998601  -1.39906988e-06  4.289061518e-08
55  0.9999998929  -1.070800211e-06 3.282700685e-08
56  0.999999918  -8.195537957e-07 2.512466496e-08
57  0.9999999373  -6.272583702e-07 1.922955627e-08
58  0.999999952  -4.800820315e-07 1.471764192e-08
59  0.9999999633  -3.674383035e-07 1.126437751e-08
60  0.9999999719  -2.812246568e-07 8.621367418e-09

Procedimiento completado satisfactoriamente
Exit code: 1
```

Con Newton:

```
options compilation execution
- N E W T O N -
Digite la aproximacion inicial : 0.8
Digite el numero de iteraciones : 100

-- po --      -- p --      -- f(p) --      -- Er --
1      0.8      1.46505806      44.55629112      0.4539465554
2      1.46505806      1.321768183      15.27619689      0.1084077213
3      1.321768183      1.197712231      5.074700143      0.1035774277
4      1.197712231      1.097657409      1.539031741      0.09115305144
5      1.097657409      1.031123006      0.3586411656      0.06452615438
6      1.031123006      1.003904402      0.03973721246      0.0271127448
7      1.003904402      1.000067629      0.0006764950549      0.003836514107
8      1.000067629      1.000000021      2.057641826e-07      6.760834245e-05
9      1.000000021      1      1.998401444e-14      2.057641435e-08
10     1      1      0      1.998401444e-15

Procedimiento completado satisfactoriamente

Exit code: 1
```

```
options compilation execution
- N E W T O N -
Digite la aproximacion inicial : 1.3
Digite el numero de iteraciones : 100

-- po --      -- p --      -- f(p) --      -- Er --
1      1.3      1.17942996      4.208606566      0.1022273849
2      1.17942996      1.084130831      1.242936365      0.08790371598
3      1.084130831      1.024053084      0.2683079008      0.0586666335
4      1.024053084      1.002389454      0.02415310844      0.02161198934
5      1.002389454      1.000025469      0.0002547212207      0.002363924336
6      1.000025469      1.000000003      2.918788811e-08      2.546628395e-05
7      1.000000003      1      0      2.918788766e-09

Procedimiento completado satisfactoriamente

Exit code: 1
```

options compilation execution

- N E W T O N -
Digite la aproximacion inicial : 0.4
Digite el numero de iteraciones : 100

	-- po --	-- p --	-- f(p) --	-- Er --
1	0.4	381.8297266	6.587147142e+25	0.9989524126
2	381.8297266	343.6467539	2.29679619e+25	0.1111111111
3	343.6467539	309.2820785	8.008433128e+24	0.1111111111
4	309.2820785	278.3538707	2.792367971e+24	0.1111111111
5	278.3538707	250.5184836	9.736385082e+23	0.1111111111
6	250.5184836	225.4666352	3.394867563e+23	0.1111111111
7	225.4666352	202.9199717	1.183717126e+23	0.1111111111
8	202.9199717	182.6279745	4.127366411e+22	0.1111111111
9	182.6279745	164.3651771	1.439123682e+22	0.1111111111
10	164.3651771	147.9286594	5.017914005e+21	0.1111111111
11	147.9286594	133.1357934	1.749638428e+21	0.1111111111
12	133.1357934	119.8222141	6.100611977e+20	0.1111111111
13	119.8222141	107.8399927	2.127151868e+20	0.1111111111
14	107.8399927	97.05599342	7.416919951e+19	0.1111111111
15	97.05599342	87.35039408	2.586120079e+19	0.1111111111
16	87.35039408	78.61535467	9.017243151e+18	0.1111111111
17	78.61535467	70.7538192	3.144118276e+18	0.1111111111
18	70.7538192	63.67843728	1.096286256e+18	0.1111111111
19	63.67843728	57.31059355	3.822513816e+17	0.1111111111
20	57.31059355	51.5795342	1.332828155e+17	0.1111111111
21	51.5795342	46.42158078	4.647284419e+16	0.1111111111
22	46.42158078	41.7794227	1.620407882e+16	0.1111111111
23	41.7794227	37.60148043	5.650012926e+15	0.1111111111
24	37.60148043	33.84133239	1.970037693e+15	0.1111111111
25	33.84133239	30.45719915	6.869096699e+14	0.1111111111
26	30.45719915	27.41147923	2.395105922e+14	0.1111111111
27	27.41147923	24.67033131	8.351217967e+13	0.1111111111
28	24.67033131	22.20329818	2.911889654e+13	0.1111111111
29	22.20329818	19.98296836	1.015313142e+13	0.1111111111
30	19.98296836	17.98467153	3.540178026e+12	0.1111111111
31	17.98467153	16.18620437	1.234383752e+12	0.1111111111
32	16.18620437	14.56758394	4.304030011e+11	0.1111111111
33	14.56758394	13.11082554	1.50072247e+11	0.1111111111
34	13.11082554	11.79974299	5.2326957e+10	0.1111111111
35	11.79974299	10.61976869	1.824528174e+10	0.1111111111
36	10.61976869	9.55779182	6361736376	0.1111111111
37	9.55779182	8.602012638	2218200316	0.1111111111
38	8.602012638	7.741811375	773438625.7	0.1111111111
39	7.741811375	6.967630238	269681373.3	0.1111111111
40	6.967630238	6.270867217	94032080.29	0.1111111107
41	6.270867217	5.643780502	32786958.81	0.1111111098
42	5.643780502	5.079402469	11432105.39	0.1111111073
43	5.079402469	4.571462267	3986128.41	0.1111111003
44	4.571462267	4.114316155	1389876.772	0.1111110801
45	4.114316155	3.702884835	484619.801	0.1111110223
46	3.702884835	3.332597116	168976.2123	0.1111108564
47	3.332597116	2.999339376	58918.09824	0.1111103805
48	2.999339376	2.699410529	20543.20669	0.1111090158
49	2.699410529	2.429482616	7162.709371	0.1111051018
50	2.429482616	2.186568268	2497.218456	0.1110938777
51	2.186568268	1.967998966	870.4624124	0.1110616954
52	1.967998966	1.771424897	303.2477974	0.1109694629
53	1.771424897	1.594864638	105.4727052	0.1107054821
54	1.594864638	1.436876084	36.51398167	0.109952804
55	1.436876084	1.297018717	12.47294178	0.1078298756
56	1.297018717	1.176943686	4.099843339	0.1020227491
57	1.176943686	1.082327354	1.205902668	0.0874193304
58	1.082327354	1.023159673	0.2572861917	0.05782839384
59	1.023159673	1.002222129	0.02244481376	0.02089112174
60	1.002222129	1.000022041	0.0002204269357	0.00220003984
61	1.000022041	1.000000002	2.1858513e-08	2.203832152e-05
62	1.000000002	1	0	2.185851278e-09

Procedimiento completado satisfactoriamente

Exit code: 1

Con Secante:

```
options compilation execution
- S E C A N T E -
Digite Xo : 0.8
Digite X1 : 0.85
Digite el numero de iteraciones : 100

XR : 1.298672405
n Raiz f(raiz) Er
1 0.8767934203 -0.7314823605
2 0.8998623152 -0.6518546118 0.0256360274
3 1.088710623 1.339508377 0.1734605171
4 0.9616800958 -0.3234400679 0.132092291
5 0.9863872732 -0.1280840913 0.02504815107
6 1.002586401 0.02616711873 0.01615733813
7 0.9998383867 -0.001614958628 0.002748458236
8 0.9999981274 -1.872612822e-05 0.0001597410177
9 1.000000001 1.362296276e-08 1.873990896e-06
10 1 -1.143529715e-13 1.362307711e-09
Procedimiento completado satisfactoriamente
Exit code: 1
```

```
options compilation execution
- S E C A N T E -
Digite Xo : 1.4
Digite X1 : 1.3
Digite el numero de iteraciones : 100

XR : 1.215547073
n Raiz f(raiz) Er
1 1.13987498 2.703157724
2 1.078616635 1.131430317 0.05679343597
3 1.034518945 0.4040561645 0.04262627627
4 1.010022688 0.1048702893 0.02425317423
5 1.001436289 0.01445607531 0.008574084736
6 1.000063433 0.0006345146213 0.00137276829
7 1.000000409 4.088633498e-06 6.302446365e-05
8 1 1.166962083e-09 4.087459013e-07
9 1 2.220446049e-15 1.166959862e-10
Procedimiento completado satisfactoriamente
Exit code: 1
```

```
options compilation execution
- S E C A N T E -
Digite Xo : 0.4
Digite X1 : 0.5
Digite el numero de iteraciones : 100

XR : 115.1056025
n Raiz f(raiz) Er
1 0.5 -0.9990234375
2 0.5 -0.9990234375 0
Procedimiento completado satisfactoriamente
Exit code: 1
```

¡RESULTADO ABSURDO!

Con Müller:

```

options compilation execution
- M U L L E R -
Digite el valor X0 : 0.6
Digite el valor X1 : 0.9
Digite el valor X2 : 1.2
Digite el numero de iteraciones : 100

n      Raiz          f(raiz)          COTA DE ERROR
2      1.2          5.191736422      0.2573292537
3      0.9544039451  -0.3729209978    0.03622513003
4      0.9902768529  -0.09308564114   0.008515584988
5      0.9987820665  -0.01211280054   0.001223832626
6      1.000005906   5.906460925e-05  5.907127509e-06
7      0.9999999992  -8.235607751e-09  8.235606641e-10
procedimiento completado satisfactoriamente

Exit code: 1

```

RESUMEN DE DESEMPEÑO DE LOS MÉTODOS PARA LA FUNCIÓN DADA en busca de la raíz positiva

MÉTODO	Valor(es) Inicial(es)	Raíz	Iteraciones	Cota de Error
Bisección	[0.8 , 1.3]	1.00000000	25	$1.49011611 \cdot 10^{-8}$
Regla Falsa	[0.8 , 1.3]	0.99999997	60	$8.62136741 \cdot 10^{-9}$
Newton	Xo = 0.8	1	10	$1.99840144 \cdot 10^{-15}$
	Xo = 1.3	1	7	$2.91878876 \cdot 10^{-9}$
	Xo = 0.4	1	62	$2.18585127 \cdot 10^{-9}$
Secante	Xo = 0.8 , X1 = 0.85	1	10	$1.36230771 \cdot 10^{-9}$
	Xo = 1.4 , X1 = 1.3	1	9	$1.16695986 \cdot 10^{-10}$
	Xo = 0.4 , X1 = 0.5	RESULTADO ABSURDO		
Müller	Xo = 0.6 X1 = 0.9 X2 = 1.2	0.99999999	6	$8.23560664 \cdot 10^{-10}$

----- FIN DEL DOCUMENTO