

```
(main):010> reload!; Methods::LinearEquations::FactorizationLuPartial.exec(a, b)
Reloading...
=>
{:iterations=>
[[{:M=>[["4.0000000", "-1.0000000", "0.0000000", "3.0000000"], ["1.0000000", "15.5000000", "3.0000000", "8.0000000"], ["0.0000000", "-1.3000000", "-4.0000000", "1.1000000"], ["14.0000000", "5.0000000", "-2.0000000", "30.0000000"]],
L:>[["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]],
U:>[["4.0000000", "-1.0000000", "0.0000000", "3.0000000"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"]]},
{:M=>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "-1.3000000", "-4.0000000", "1.1000000"], ["0.0000000", "-2.4285714", "0.5714286", "-5.5714286"]],
L:>[["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0714286", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.2857143", "0.0000000", "0.0000000", "1.0000000"]],
U:>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"]]},
{:M=>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "0.0000000", "-3.7301887", "1.6028302"], ["0.0000000", "0.0000000", "1.0754717", "-4.6320755"]],
L:>[["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0714286", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "-0.0858491", "1.0000000"], ["0.2857143", "-0.1603774", "0.0000000", "1.0000000"]],
U:>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "0.0000000", "-3.7301887", "1.6028302"], ["0.0000000", "0.0000000", "0.0000000", "0.0000000"]]},
{:M=>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "0.0000000", "-3.7301887", "1.6028302"], ["0.0000000", "0.0000000", "0.0000000", "-4.1699545"]],
L:>[["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0714286", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "-0.0858491", "1.0000000", "0.0000000"], ["0.2857143", "-0.1603774", "-0.2883156", "1.0000000"]],
U:>[["14.0000000", "5.0000000", "-2.0000000", "30.0000000"], ["0.0000000", "15.1428571", "3.1428571", "5.8571429"], ["0.0000000", "0.0000000", "-3.7301887", "1.6028302"], ["0.0000000", "0.0000000", "0.0000000", "-4.1699545"]]}],
:solution=>["0.5251092", "0.2554585", "-0.4104803", "-0.2816594"],
:errors=>[]}
```

# Crout

```
irb(main):011> reload!; Methods::LinearEquations::Crout.exec(a, b)
Reloading...
=>
{:solution=>["0.5251092", "0.2554585", "-0.4104803", "-0.2816594"],
:iterations=>
[{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]],
:U=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"]]},
{:L=>["4.0000000", "0.0000000", "0.0000000", "0.0000000"], ["1.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["14.0000000", "0.0000000", "0.0000000", "1.0000000"]],
:U=>["1.0000000", "-0.2500000", "0.0000000", "0.7500000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["4.0000000", "0.0000000", "0.0000000", "0.0000000"], ["1.0000000", "15.7500000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["14.0000000", "8.5000000", "0.0000000", "1.0000000"]],
:U=>["1.0000000", "-0.2500000", "0.0000000", "0.7500000"], ["0.0000000", "1.0000000", "0.1904762", "0.4603175"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["4.0000000", "0.0000000", "0.0000000", "0.0000000"], ["1.0000000", "15.7500000", "0.0000000", "0.0000000"], ["0.0000000", "-1.3000000", "-3.7523810", "0.0000000"], ["14.0000000", "8.5000000", "-3.6190476", "1.0000000"]],
:U=>["1.0000000", "-0.2500000", "0.0000000", "0.7500000"], ["0.0000000", "1.0000000", "0.1904762", "0.4603175"], ["0.0000000", "0.0000000", "1.0000000", "-0.4526227"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
:errors=>[]}]
```

# Doolittle.

```
irb(main):012> reload!; Methods::LinearEquations::Doolittle.exec(a, b)
Reloading...
=>
{:solution=>["0.5251092", "0.2554585", "-0.4104803", "-0.2816594"],
:iterations=>
[{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]],
:U=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"]]},
{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.2500000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["3.5000000", "0.0000000", "0.0000000", "1.0000000"]],
:U=>["4.0000000", "-1.0000000", "0.0000000", "3.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.2500000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["3.5000000", "0.5396825", "0.0000000", "1.0000000"]],
:U=>["4.0000000", "-1.0000000", "0.0000000", "3.0000000"], ["0.0000000", "15.7500000", "3.0000000", "7.2500000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.2500000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "-0.0825397", "1.0000000", "0.0000000"], ["3.5000000", "0.5396825", "0.9644670", "1.0000000"]],
:U=>["4.0000000", "-1.0000000", "0.0000000", "3.0000000"], ["0.0000000", "15.7500000", "3.0000000", "7.2500000"], ["0.0000000", "0.0000000", "-3.7523810", "1.6984127"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
:errors=>[]}]
```

## Cholesky.

```
irb(main):013> reload!; Methods::LinearEquations::Cholesky.exec(a, b)
Reloading...
=>
{:solution=>[(0.5251091703056768+0.0i), (0.2554585152838428+0.0i), (-0.4104803493449782+0.0i), (-0.2816593886462882+0.0i)],
:iterations=>
[{:L=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]],
:U=>["1.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["2.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.5000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["7.0000000", "0.0000000", "0.0000000", "30.0000000"]],
:U=>["2.0000000", "-0.5000000", "0.0000000", "1.5000000"], ["0.0000000", "1.0000000", "0.0000000", "0.0000000"], ["0.0000000", "0.0000000", "1.0000000", "0.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>["2.0000000", "0.0000000", "0.0000000", "0.0000000"], ["0.5000000", "3.9686270", "0.0000000", "0.0000000"], ["0.0000000", "-0.3275692", (-0.0+1.9371063348151418i), "0.0000000"], ["7.0000000", "2.1417987", (-0.0+1.8682751452531825i), "30.2476190"]],
:U=>
[["2.0000000", "-0.5000000", "0.0000000", "1.5000000"],
["0.0000000", "3.9686270", "0.7559289", "1.8268283"],
["0.0000000", "0.0000000", (0+1.9371063348151418i), (-0.0-0.8767782479916252i)],
["0.0000000", "0.0000000", "0.0000000", "1.0000000"]]},
{:L=>
[["2.0000000", "0.0000000", "0.0000000", "0.0000000"],
["0.5000000", "3.9686270", "0.0000000", "0.0000000"],
["0.0000000", "-0.3275692", (-0.0+1.9371063348151418i), "0.0000000"],
["7.0000000", "2.1417987", (-0.0+1.8682751452531825i), (3.7348679466187558+0.0i)]],
:U=>
[["2.0000000", "-0.5000000", "0.0000000", "1.5000000"],
["0.0000000", "3.9686270", "0.7559289", "1.8268283"],
["0.0000000", "0.0000000", (0+1.9371063348151418i), (-0.0-0.8767782479916252i)],
["0.0000000", "0.0000000", "0.0000000", (3.7348679466187558+0.0i)]]]},
:errors=>[]}
```

## Jacobi.

```
{:spectral_radius=>0.7535169428701504,
:T=>[["0.0000000", "0.2500000", "0.0000000", "-0.7500000"], ["-0.0645161", "0.0000000", "-0.1935484", "-0.5161290"], ["0.0000000", "-0.3250000", "0.0000000", "0.2750000"], ["-0.4666667", "-0.1666667", "0.0666667", "0.0000000"]],
:C=>["0.2500000", "0.0645161", "-0.2500000", "0.0333333"],
:errors=>[],
:iterations=>
[{:iteration=>0, :error=>nil, :value=>[0, 0, 0, 0]},
{:iteration=>1, :error=>0.3609341242060913, :value=>[0.25, 0.06451612903225806, -0.25, 0.03333333333333333]},
{:iteration=>2, :error=>0.14562059206430902, :value=>[0.2411290322580645, 0.07956989247311827, -0.2618010752688172, -0.110752688172043]},
{:iteration=>3, :error=>0.14300818286037656, :value=>[0.35295698924731184, 0.15679327089836975, -0.3063172043010753, -0.10990860215053763]},
{:iteration=>4, :error=>0.0748014357566136, :value=>[0.37162976933749564, 0.15775893166840096, -0.33118267863336803, -0.1779332870852122]},
{:iteration=>5, :error=>0.06781846767106765, :value=>[0.4228896982310094, 0.1964764234351165, -0.3502033067406637, -0.18846589287778934]},
{:iteration=>6, :error=>0.039794838535037354, :value=>[0.4404685255171211, 0.2022869267750514, -0.36568295815780494, -0.2201081501963681]},
{:iteration=>7, :error=>0.034373218837995455, :value=>[0.46565284434103893, 0.2204803580985315, -0.37627299250589297, -0.2303119969143521]},
{:iteration=>8, :error=>0.022299115905640772, :value=>[0.47785408721039696, 0.2261717489349327, -0.38499191553346956, -0.24580291987596625]},
{:iteration=>9, :error=>0.018404146842246727, :value=>[0.4908951271407079, 0.23506742054178978, -0.39110162136974386, -0.253026659889572]},
{:iteration=>10, :error=>0.012742089432607018, :value=>[0.49853685005262643, 0.23913696877968385, -0.395979243145714, -0.26100240418061155]},
{:iteration=>11, :error=>0.010153523789418877, :value=>[0.5055360453303797, 0.24370452340834886, -0.39949517600306544, -0.26557197436422064]},
{:iteration=>12, :error=>0.0072971844310540605, :value=>[0.5101051116252526, 0.24629195339306978, -0.4022362630578741, -0.2698339201224397]},
{:iteration=>13, :error=>0.005682976184690889, :value=>[0.5139484284400972, 0.248727442184050883, -0.4042492128864186, -0.27258012852782115]},
{:iteration=>14, :error=>0.004170129100507804, :value=>[0.5166169518559931, 0.25028646699624046, -0.4057959474433162, -0.27491378443789144]},
{:iteration=>15, :error=>0.003202876242866248, :value=>[0.5187569550774787, 0.2516181397404572, -0.40694439249419834, -0.2765220518617246]},
{:iteration=>16, :error=>0.002377650044978286, :value=>[0.5202960738314077, 0.25202960738314077, -0.4078194596776229, -0.27781922849251284]},
{:iteration=>17, :error=>0.0018113554695020299, :value=>[0.5214975284225929, 0.2532720085897783, -0.4084733270046118, -0.278748203135304]},
{:iteration=>18, :error=>0.0013534193250926492, :value=>[0.5223791544989226, 0.2538005211402371, -0.40896915865388656, -0.27947573649581386]},
{:iteration=>19, :error=>0.0010262349782541843, :value=>[0.5230569326569197, 0.25421511054382245, -0.4093409969069259, -0.2800083028664625]},
{:iteration=>20, :error=>0.00076500000146023, :value=>[0.523560047089004, 0.2545182270890355, -0.4096231013150105, -0.28041808600000071]},
{:iteration=>21, :error=>0.0005819809551116511, :value=>[0.5239434212383356, 0.2547519014314331, -0.40983350685614006, -0.28072251927776887]},
{:iteration=>22, :error=>0.00043734544932135406, :value=>[0.5242298648161849, 0.25492498410014425, -0.4099930607666022, -0.28095448060687145]},
{:iteration=>23, :error=>0.00033021804325998687, :value=>[0.5244471064801897, 0.2550571072476512, -0.4101131019994365, -0.2811276383153505]},
{:iteration=>24, :error=>0.00024844229604974345, :value=>[0.5246100055484256, 0.25515569716393055, -0.410203660392208, -0.28125904103199284]},
{:iteration=>25, :error=>0.00018742217993443074, :value=>[0.5247332050649773, 0.25523053573446075, -0.41027183786207544, -0.2813575294760676]},
{:iteration=>26, :error=>0.00014110240885324373, :value=>[0.5248257810406659, 0.25528661576321227, -0.41032324471961834, -0.2814320408435379]},
{:iteration=>27, :error=>0.0001063930267025257, :value=>[0.5248956845734565, 0.25532905031396724, -0.4103619613550169, -0.2814880167608207]},
{:iteration=>28, :error=>8.012914855822039e-05, :value=>[0.5249482751491074, 0.255360924746978, -0.410391145961265, -0.2815302919436087]},
{:iteration=>29, :error=>6.0401258845763264e-05, :value=>[0.524987950144451, 0.2553849998892617, -0.4104131308272603, -0.28156209225816414]},
{:iteration=>30, :error=>4.550053096232147e-05, :value=>[0.5250178191659385, 0.25540310841307373, -0.4104297003350052, -0.2815860854374381]},
{:iteration=>31, :error=>3.429271169817719e-05, :value=>[0.525040341181347, 0.25541677195732787, -0.41044218372954444, -0.28160414703528397]},
{:iteration=>32, :error=>2.5835995875187863e-05, :value=>[0.525057303265795, 0.2554270571799715, -0.41045159132083464, -0.2816177667928196]},
{:iteration=>33, :error=>1.9470213684017856e-05, :value=>[0.5250700893896075, 0.2554348132283397, -0.41045867945151615, -0.28162802380875523]},
{:iteration=>34, :error=>1.4669798856319548e-05, :value=>[0.5250797211636513, 0.25544065415709566, -0.4104640208466181, -0.28163575588330786]},
{:iteration=>35, :error=>1.1054701396074889e-05, :value=>[0.5250869804517548, 0.2554450573188817, -0.41046804546896576, -0.2816415802923278]},
{:iteration=>36, :error=>8.329473337992045e-06, :value=>[0.5250924495489663, 0.25544937408346865, -0.4104710782090267, -0.2816459701285636]},
{:iteration=>37, :error=>6.276644365854363e-06, :value=>[0.5250965711172899, 0.25545087394236277, -0.4104733633624823, -0.2816492773506975]},
{:iteration=>38, :error=>4.72941863820054e-06, :value=>[0.5250996764986138, 0.255452757275854, -0.4104750853027097, -0.28165176973596123]},
{:iteration=>39, :error=>3.5637761663255912e-06, :value=>[0.5251020166209344, 0.255454161096738538, -0.255454161096738538, -0.28165459701285636]},
{:iteration=>40, :error=>2.6853207891975457e-06, :value=>[0.525103779849087, 0.25545524597070535, -0.41047736048462313, -0.2816550627092088]},
{:iteration=>41, :error=>2.0234602362765088e-06, :value=>[0.5251051085245829, 0.25545605182441633, -0.41047809718551165, -0.2816561289569997]},
{:iteration=>42, :error=>1.524697070927425e-06, :value=>[0.5251067096738538, 0.2554566590121258, -0.41047865230611025, -0.2816569324279089]},
{:iteration=>43, :error=>1.1488933128741926e-06, :value=>[0.5251068640739631, 0.25545711655920955, -0.4104790705966158, -0.28165753783689346]},
{:iteration=>44, :error=>8.657058973690109e-07, :value=>[0.5251074325174725, 0.2554574613168408, -0.4104793857868888, -0.2816579940341588]},
{:iteration=>45, :error=>6.523267194954694e-07, :value=>[0.5251078608548293, 0.25545772110428805, -0.4104796232873669, -0.2816583377800866]},
{:iteration=>46, :error=>4.915377252707973e-07, :value=>[0.525108183611137, 0.2554579168547073, -0.41047980224841746, -0.2816585968021261]},
{:iteration=>47, :error=>3.70382861931307e-07, :value=>[0.5251084268152715, 0.25545806435813706, -0.41047993709836456, -0.281658791977543]},
{:iteration=>48, :error=>2.790892744544141e-07, :value=>[0.5251086100726915, 0.2554581755032365, -0.4104800387102189, -0.2816589390467072]},
{:iteration=>49, :error=>2.1029877371576512e-07, :value=>[0.5251087481608395, 0.25545825925365306, -0.4104801152763964, -0.28165904986514334]},
{:iteration=>50, :error=>1.5846353175949114e-07, :value=>[0.5251088521222708, 0.25545832326061267, -0.41048017297035166, -0.2816591332690937]},
{:iteration=>51, :error=>1.1940504538261154e-07, :value=>[0.5251089306169734, 0.2554583699130022, -0.4104802164436999, -0.2816591962905186]},
{:iteration=>52, :error=>8.997367404010961e-08, :value=>[0.5251089896961395, 0.2554584057444048, -0.41048024920161835, -0.2816592437030013]}]
```



## Gauss-Seidel.

```
irb(main):017> reload!; Methods::LinearEquations::GaussSeidel.exec(a, b, x0, 2)
Reloading...
=>
{:spectral_radius=>0.5994876461601166,
:T=>[["0.0000000", "0.2500000", "0.0000000", "-0.7500000"], ["0.0000000", "-0.0161290", "-0.1935484", "-0.4677419"], ["0.0000000", "0.0052419", "0.0629032", "0.4270161"], ["0.0000000", "-0.1136290", "0.0364516", "0.4564247"]],
:C=>["0.2500000", "0.0483871", "-0.2657258", "-0.1091129"],
:errors=>[],
:iterations=>
[{:iteration=>0, :error=>nil, :value=>[0, 0, 0, 0]},
{:iteration=>1, :error=>0.38387125576026065, :value=>[0.25, 0.04838709677419355, -0.2657258064516129, -0.10911290322580647]},
{:iteration=>2, :error=>0.16541590217059005, :value=>[0.3439314516129032, 0.1500741415192508, -0.32878014438085335, -0.17409904396462023]},
{:iteration=>3, :error=>0.10021770191219365, :value=>[0.4180928183532779, 0.19103483654878994, -0.3599635589686273, -0.21761335858756983]},
{:iteration=>4, :error=>0.059762438191934206, :value=>[0.46096872807787487, 0.216763149517972, -0.3802916972049226, -0.2432653778363318]},
{:iteration=>5, :error=>0.03581183412000457, :value=>[0.48663982075674184, 0.23228118022894712, -0.3923893624793991, -0.2586380705565973]},
{:iteration=>6, :error=>0.021472896929316684, :value=>[0.5020488479746847, 0.24156282605911555, -0.39963338787227687, -0.26785882592285726]},
{:iteration=>7, :error=>0.012872489375017275, :value=>[0.5112848259569218, 0.2471281254866301, -0.40397781791194054, -0.27338612755513125]},
{:iteration=>8, :error=>0.007716879024174241, :value=>[0.5168216270380059, 0.2504645707831526, -0.4065821705821857, -0.27669966578707395]},
{:iteration=>9, :error=>0.004626178059659651, :value=>[0.5201408920360936, 0.2524647061940036, -0.40814343760449656, -0.2786860964894774]},
{:iteration=>10, :error=>0.002773336370545754, :value=>[0.522130748915609, 0.25366376360088383, -0.4090793997048936, -0.27987693674109104]},
{:iteration=>11, :error=>0.0016625808687072675, :value=>[0.5233236434560392, 0.2543825838443464, -0.4096404973532127, -0.2805908307437569]},
{:iteration=>12, :error=>0.000996696961832656, :value=>[0.5240387690189043, 0.2548135076768251, -0.4099768684495013, -0.2810188013849263]},
{:iteration=>13, :error=>0.0005975073561320603, :value=>[0.524467477957901, 0.25507184119161375, -0.4101785187681293, -0.2812753644968314]},
{:iteration=>14, :error=>0.00035819827846180527, :value=>[0.5247244836705269, 0.2552267089424846, -0.4102994056429362, -0.2814291709128558]},
{:iteration=>15, :error=>0.0002147354428186788, :value=>[0.5248785554202631, 0.25531955024589625, -0.4103718758309517, -0.28152137595916893]},
{:iteration=>16, :error=>0.00012873124516221438, :value=>[0.5249709195308507, 0.25537520746034553, -0.4104153208133838, -0.28157665174534685]},
{:iteration=>17, :error=>7.717279114958393e-05, :value=>[0.5250262906740966, 0.25540857327282773, -0.4104413655436394, -0.2816097888962923]},
{:iteration=>18, :error=>4.626413491387999e-05, :value=>[0.5250594849904262, 0.2554285756652149, -0.41045697903767525, -0.28162965420891306]},
{:iteration=>19, :error=>2.7734777341110977e-05, :value=>[0.5250793845729885, 0.2554405668523446, -0.4104663391344631, -0.28164156321841627]},
{:iteration=>20, :error=>1.6626656384990387e-05, :value=>[0.5250913141268984, 0.2554477554208917, -0.4104719503968543, -0.28164870252249147]},
{:iteration=>21, :error=>9.967475099744984e-06, :value=>[0.5250984657470915, 0.25545206487892924, -0.4104753142793372, -0.2816529824470867]},
{:iteration=>22, :error=>5.975378185745963e-06, :value=>[0.5251027530550474, 0.2554546483457844, -0.4104773308853288, -0.28165554820900807]},
{:iteration=>23, :error=>3.582165403429045e-06, :value=>[0.5251053232432021, 0.2554561971022483, -0.4104785398157079, -0.28165708635158293]},
{:iteration=>24, :error=>2.147463905953297e-06, :value=>[0.5251068640392493, 0.25545712556261535, -0.4104792645545353, -0.2816580084490546]},
{:iteration=>25, :error=>1.2873780821726446e-06, :value=>[0.5251077877274448, 0.25545768216313536, -0.41047969902650905, -0.2816585612350974]},
{:iteration=>26, :error=>7.71767256209691e-07, :value=>[0.5251083414671069, 0.25545801583827094, -0.4104799594870899, -0.2816588926235011]},
{:iteration=>27, :error=>4.6266493574122206e-07, :value=>[0.5251086734271935, 0.25545821587239254, -0.4104801156299904, -0.28165909128675515]},
{:iteration=>28, :error=>2.773619133929203e-07, :value=>[0.5251088724331645, 0.2554583357903773, -0.4104802092357303, -0.2816592103829217]},
{:iteration=>29, :error=>1.6627504048509075e-07, :value=>[0.5251089917347855, 0.25545840767972766, -0.41048026535121496, -0.28165928177960226]},
{:iteration=>30, :error=>9.96798326917106e-08, :value=>[0.5251090632546336, 0.2554584507765051, -0.4104802989917548, -0.2816593245810302]}]
```

## SOR.

```
{spectral_radius=>0.6312081938144992,
:T=>[["-0.5000000", "0.3750000", "-0.0000000", "-1.1250000"], ["0.0483871", "-0.5362903", "-0.2903226", "-0.6653226"], ["-0.0235887", "0.2614415", "-0.3584677", "0.7368448"], ["0.3355444", "-0.1022833", "0.0367339", "0.5275151"]],
:C=>["0.3750000", "0.0604839", "-0.4044859", "-0.2680696"],
:errors=>[],
:iterations=>
[{:iteration=>0, :error=>nil, :value=>[0, 0, 0, 0]},
{:iteration=>1, :error=>0.6162413639182877, :value=>[0.3750000000000001, 0.06048387096774193, -0.4044858870967742, -0.26806955645161296]},
{:iteration=>2, :error=>0.3183687701744234, :value=>[0.5117597026209678, 0.34197623325312176, -0.4500491621988001, -0.30469598814203147]},
{:iteration=>3, :error=>0.1453273235043117, :value=>[0.5901442228192222, 0.2352284481069968, -0.3903363824613489, -0.30859371217532394]},
{:iteration=>4, :error=>0.10981562792867317, :value=>[0.5153064828277523, 0.28152632710381315, -0.44437079950475555, -0.2712363436181935]},
{:iteration=>5, :error=>0.0736017944866152, :value=>[0.5280600178205216, 0.2439087522196379, -0.3836051086972005, -0.28336153958989785]},
{:iteration=>6, :error=>0.04309603460965147, :value=>[0.5212175052107386, 0.25512531462566934, -0.42445767161224646, -0.2793985796702101]},
{:iteration=>7, :error=>0.02128918689373877, :value=>[0.5243866425082431, 0.25800266620556955, -0.40379937808305355, -0.2822519642803629]},
{:iteration=>8, :error=>0.010743255901629264, :value=>[0.5270911383883754, 0.2525137678749915, -0.4126297080631813, -0.28222922750674734]},
{:iteration=>9, :error=>0.006899037365800205, :value=>[0.5236549747040249, 0.2581367905340685, -0.410946387700301, -0.281072704942991]},
{:iteration=>10, :error=>0.0051794200762048, :value=>[0.5261806021591282, 0.2536967854251305, -0.40914647983358443, -0.28212891337953533]},
{:iteration=>11, :error=>0.004227797073687303, :value=>[0.5244410210068371, 0.25638029040326044, -0.41179032842385555, -0.28131836345821903]},
{:iteration=>12, :error=>0.002849285110794216, :value=>[0.5254052572883006, 0.25508527115150054, -0.4095027304009441, -0.2818460892006705]},
{:iteration=>13, :error=>0.0016903257881473225, :value=>[0.5250311983884168, 0.25551340052938964, -0.411072929352882, -0.28158443733919214]},
{:iteration=>14, :error=>0.0008831838909803871, :value=>[0.525084418010904, 0.2555474805831709, -0.41019651251027156, -0.2816733953348566]},
{:iteration=>15, :error=>0.0004363164190456083, :value=>[0.5251706659649509, 0.2553365210869355, -0.4105685733503736, -0.28167375611480855]},
{:iteration=>16, :error=>0.0002698699472419339, :value=>[0.525048838054285, 0.2555620876096262, -0.41049265543186453, -0.2816370960261883]},
{:iteration=>17, :error=>0.0002155237220283207, :value=>[0.5251530968559293, 0.25538879209671955, -0.4104310105420212, -0.2816789188644383]},
{:iteration=>18, :error=>0.0001666534746775477, :value=>[0.5250830323307983, 0.25549670235913424, -0.41053169116064814, -0.2816460079051881]},
{:iteration=>19, :error=>0.0001138496493698299, :value=>[0.5251215061126129, 0.255442774363417, -0.4104414851827318, -0.28166689243536247]},
{:iteration=>20, :error=>6.81680008614268e-05, :value=>[0.5251055413197578, 0.25546126317745316, -0.41050421633722955, -0.2816561701342355]},
{:iteration=>21, :error=>3.592628140118397e-05, :value=>[0.5251083944326811, 0.2554616537970371, -0.410468618237813, -0.2816600663087996]},
{:iteration=>22, :error=>1.771948170705594e-05, :value=>[0.525111497554948, 0.2554538396462125, -0.4104842150610019, -0.2816598965517172]},
{:iteration=>23, :error=>1.0644413450770965e-05, :value=>[0.5251068247105376, 0.2554625956174943, -0.41048061516061085, -0.2816585394419524]},
{:iteration=>24, :error=>8.426539811514672e-06, :value=>[0.5251109178734881, 0.25545572572131386, -0.41047850622864046, -0.281660154843658]},
{:iteration=>25, :error=>6.571070997253343e-06, :value=>[0.525108112407864, 0.2554600705290838, -0.410482345141617, -0.28165885341010843]},
{:iteration=>26, :error=>4.5378254338455475e-06, :value=>[0.5251096803308465, 0.2554578533523812, -0.410478807970147, -0.28165969366164834]},
{:iteration=>27, :error=>2.747050765903726e-06, :value=>[0.5251090102110743, 0.2554586503876049, -0.4104813117143138, -0.2816592540852604]},
{:iteration=>28, :error=>1.4620350789238693e-06, :value=>[0.5251091496357327, 0.2554586249535484, -0.4104798661178678, -0.2816594205525566]},
{:iteration=>29, :error=>7.20197105933166e-07, :value=>[0.5251092576613405, 0.2554583364051015, -0.4104805169164827, -0.28165940587958377]},
{:iteration=>30, :error=>4.2073850473653254e-07, :value=>[0.5251090789357746, 0.2554586755571599, -0.4104803508012024, -0.2816593562846606]},
{:iteration=>31, :error=>3.2934549140139734e-07, :value=>[0.5251092396862909, 0.2554584038015427, -0.4104802809200734, -0.2816594186804664]},
{:iteration=>32, :error=>2.5887578869223076e-07, :value=>[0.5251091275979579, 0.2554585785449699, -0.41048042678632857, -0.28165936729321267]},
{:iteration=>33, :error=>1.8071483195070754e-07, :value=>[0.525109191360249, 0.25545848756729933, -0.41048028830434435, -0.2816594010278273]},
{:iteration=>34, :error=>1.105975394588755e-07, :value=>[0.5251091633139185, 0.2554585216829697, -0.4104803880922543, -0.2816593830357972]},
{:iteration=>35, :error=>5.945865338161769e-08, :value=>[0.5251091698894262, 0.2554585190301649, -0.41048032948334456, -0.2816593901105755]}]
```

## Vandermonde.

```
irb(main):025> reload!; Methods::Interpolation::Vandermonde.exec(tabla)
Reloading...
=>
{:matrix=>[["-1.0000000", "1.0000000", "-1.0000000", "1.0000000"], ["0.0000000", "0.0000000", "0.0000000", "1.0000000"], ["27.0000000", "9.0000000", "3.0000000", "1.0000000"], ["64.0000000", "16.0000000", "4.0000000", "1.0000000"],
:B=>[15.5, 3.0, 8.0, 1.0],
:Pc=>["-1.1416667", "5.8250000", "-5.5333333", "3.0000000"]}]
```

## Newton.

```
irb(main):041> reload!; Methods::Interpolation::Newton.exec(tabla)
Reloading...
=>
{:table=>[["15.5000000", "-12.5000000", "3.5416667", "-1.1416667"], ["3.0000000", "1.6666667", "-2.1666667", "0.0000000"], ["8.0000000", "-7.0000000", "0.0000000", "0.0000000"], ["1.0000000", "0.0000000", "0.0000000", "0.0000000"],
:newton_coefficients=>[15.5, -12.5, 3.5416666666666665, -1.1416666666666666]}]
```

## Lagrange.

```
irb(main):043> reload!; Methods::Interpolation::Lagrange.exec(tabla)
Reloading...
=>
{:polynomials=>
  ["((x)(x - 3.0)(x - 4.0)) / ((-1.0)(-1.0 - 3.0)(-1.0 - 4.0))",
   "((x + 1.0 )(x - 3.0)(x - 4.0)) / ((-1.0)(3.0)(4.0))",
   "((x + 1.0 )(x)(x - 4.0)) / ((3.0 + 1.0)(3.0)(3.0 - 4.0))",
   "((x + 1.0 )(x)(x - 3.0)) / ((4.0 + 1.0)(4.0)(4.0 - 3.0))"],
:polynom=>
  "(15.5 * ((x)(x - 3.0)(x - 4.0)) / ((-1.0)(-1.0 - 3.0)(-1.0 - 4.0))) + (3.0 * ((x + 1.0 )(x - 3.0)(x - 4.0)) / ((-1.0)(3.0)(4.0))) + (8.0 * ((x + 1.0 )(x - 4.0)) / ((3.0 + 1.0)(3.0)(3.0 - 4.0))) + (1.0 * ((x + 1.0 )(x - 3.0)) / ((4.0 + 1.0)(4.0)(4.0 - 3.0)))"}]
```

### Trazadores Lineales.

```
irb(main):046> reload!; Methods::Interpolation::SplineLinear.exec(tabla)
Reloading...
=> {:polynomials=>["-12.5000000x + 3.0000000", "1.6666667x + 3.0000000", "-7.0000000x + 29.0000000"], :
:coefficients=>[["-12.5000000", "3.0000000"], ["1.6666667", "3.0000000"], ["-7.0000000", "29.0000000"]]}
#<SplineLinear:0x0000000000000000>
```

### Trazadores Lineales.

```
irb(main):044> reload!; Methods::Interpolation::SplineQuadratic.exec(tabla)
Reloading...
=>
{:polynomials=>["0.0000000x^2 + -12.5000000x + 3.0000000", "4.7222222x^2 + -12.5000000x + 3.0000000", "-37.0000000x^2 + 252.0000000x + -415.0000000"],
:coefficients=>[["0.0000000", "-12.5000000", "3.0000000"], ["4.7222222", "-12.5000000", "3.0000000"], ["-37.0000000", "252.0000000", "-415.0000000"]]}
#<SplineQuadratic:0x0000000000000000>
```