semmcci: Internal Tests

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Tests

```
#> test-semmcci-mc-latent-med-defined-none
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-std-defined-none

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-std-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-moment

#> Test passed

#> test-semmcci-mc-simple-med-defined-equality

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-inequality

#> Test passed
#> Test passed
#> Test passed
```

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#> test-semmcci-mc-simple-med-defined-none-mi-adj

#> Test passed

#> test-semmcci-mc-simple-med-defined-none-mi

#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-none

#> Test passed
#> Test passed
#> Test passed
#> Monte Carlo Confidence Intervals
#>          est      se    R    0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> cp   -0.0199 0.0326 2000 -0.1219 -0.1086 -0.0843 0.0461 0.0609 0.0867
#> b     0.0817 0.0335 2000 -0.0293 -0.0060  0.0164 0.1493 0.1707 0.1970
#> a     0.1098 0.0311 2000  0.0200  0.0303  0.0477 0.1696 0.1926 0.2068
#> y~~y  1.0476 0.0471 2000  0.8903  0.9296  0.9570 1.1412 1.1704 1.1989
#> m~~m  0.9615 0.0423 2000  0.8382  0.8510  0.8784 1.0424 1.0642 1.0949
#> x~~x  1.0040 0.0448 2000  0.8497  0.8872  0.9202 1.0891 1.1235 1.1380
#> y~1  -0.0038 0.0330 2000 -0.1104 -0.0885 -0.0702 0.0607 0.0798 0.1111
#> m~1  -0.0050 0.0322 2000 -0.1090 -0.0878 -0.0687 0.0594 0.0805 0.0902
#> x~1  -0.0258 0.0320 2000 -0.1175 -0.1012 -0.0859 0.0365 0.0579 0.0845
#> Standardized Monte Carlo Confidence Intervals
#>          est      se    R    0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> cp   -0.0194 0.0318 2000 -0.1228 -0.1059 -0.0819 0.0441 0.0576 0.0824
#> b     0.0785 0.0321 2000 -0.0281 -0.0060  0.0156 0.1449 0.1640 0.1892
#> a     0.1115 0.0313 2000  0.0212  0.0315  0.0490 0.1711 0.1956 0.2052
#> y~~y  0.9938 0.0055 2000  0.9610  0.9713  0.9780 0.9991 0.9997 1.0000
#> m~~m  0.9876 0.0071 2000  0.9579  0.9617  0.9707 0.9976 0.9990 0.9995
#> x~~x  1.0000 0.0000 2000  1.0000  1.0000  1.0000 1.0000 1.0000 1.0000

#> test-semmcci-mc-simple-med-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-std-defined-none-random-x

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-std-defined-none

#> Test passed
#> Test passed
#> Test passed
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#> test-semmcci-mc-simple-med-std-defined

#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-methods

#> Monte Carlo Confidence Intervals
#>                      est     se   R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> visual=~x2        0.5535 0.1105 100 0.2861  0.2918  0.3095  0.7311  0.7565  0.7637
#> visual=~x3        0.7294 0.1095 100 0.4956  0.4972  0.5146  0.9399  0.9814  0.9950
#> textual=~x5       1.1131 0.0582 100 0.9477  0.9605  0.9819  1.2057  1.2278  1.2382
#> textual=~x6       0.9261 0.0495 100 0.8048  0.8140  0.8342  1.0208  1.0521  1.0567
#> speed=~x8         1.1800 0.1614 100 0.7234  0.7328  0.8622  1.4650  1.5273  1.5701
#> speed=~x9         1.0815 0.1659 100 0.6284  0.6751  0.7416  1.3510  1.3647  1.3669
#> x1~~x1            0.5491 0.1213 100 0.2431  0.2634  0.3081  0.7646  0.8158  0.8293
#> x2~~x2            1.1338 0.1094 100 0.8059  0.8452  0.9204  1.3553  1.3711  1.3745
#> x3~~x3            0.8443 0.0956 100 0.6243  0.6280  0.6770  1.0270  1.0594  1.0609
#> x4~~x4            0.3712 0.0486 100 0.2738  0.2776  0.2824  0.4614  0.4943  0.5016
#> x5~~x5            0.4463 0.0562 100 0.3104  0.3294  0.3531  0.5575  0.5842  0.5921
#> x6~~x6            0.3562 0.0406 100 0.2662  0.2671  0.2709  0.4262  0.4405  0.4415
#> x7~~x7            0.7994 0.0878 100 0.5759  0.5811  0.6202  0.9613  0.9908  1.0137
#> x8~~x8            0.4877 0.0632 100 0.2928  0.2948  0.3490  0.5814  0.6166  0.6285
#> x9~~x9            0.5661 0.0679 100 0.4097  0.4182  0.4444  0.6903  0.7045  0.7101
#> visual~~visual    0.8093 0.1507 100 0.3516  0.4046  0.5196  1.1125  1.2097  1.2136
#> textual~~textual  0.9795 0.1181 100 0.7217  0.7378  0.7749  1.2193  1.2567  1.2728
#> speed~~speed      0.3837 0.0897 100 0.1855  0.1885  0.2275  0.5512  0.6085  0.6352
#> visual~~textual   0.4082 0.0804 100 0.2073  0.2111  0.2334  0.5776  0.6220  0.6364
#> visual~~speed     0.2622 0.0651 100 0.0992  0.1066  0.1522  0.3714  0.3984  0.4032
#> textual~~speed    0.1735 0.0464 100 0.0408  0.0498  0.0920  0.2708  0.2744  0.2773
#> Standardized Monte Carlo Confidence Intervals
#>                      est     se   R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> visual=~x2        0.4236 0.0710 100 0.2450  0.2465  0.2594  0.5616  0.6044  0.6193
#> visual=~x3        0.5811 0.0543 100 0.4322  0.4377  0.4564  0.6835  0.6972  0.6973
#> textual=~x5       0.8551 0.0216 100 0.7904  0.7906  0.8066  0.8892  0.8934  0.8967
#> textual=~x6       0.8380 0.0206 100 0.7830  0.7907  0.8028  0.8790  0.8816  0.8820
#> speed=~x8         0.7230 0.0514 100 0.5612  0.5612  0.6165  0.8109  0.8207  0.8266
#> speed=~x9         0.6650 0.0495 100 0.5352  0.5406  0.5534  0.7445  0.7531  0.7542
#> x1~~x1            0.4042 0.0928 100 0.1687  0.1882  0.2361  0.5875  0.6619  0.7017
#> x2~~x2            0.8206 0.0599 100 0.6164  0.6344  0.6844  0.9327  0.9392  0.9400
#> x3~~x3            0.6623 0.0616 100 0.5137  0.5140  0.5327  0.7916  0.8084  0.8132
#> x4~~x4            0.2748 0.0386 100 0.1988  0.1997  0.2041  0.3460  0.3632  0.3639
#> x5~~x5            0.2689 0.0367 100 0.1959  0.2019  0.2093  0.3493  0.3749  0.3752
#> x6~~x6            0.2977 0.0346 100 0.2221  0.2228  0.2274  0.3555  0.3746  0.3869
#> x7~~x7            0.6757 0.0663 100 0.5253  0.5292  0.5387  0.8013  0.8251  0.8301
#> x8~~x8            0.4772 0.0729 100 0.3167  0.3265  0.3425  0.6196  0.6851  0.6851
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#> x9~~x9          0.5578 0.0645 100 0.4312 0.4329 0.4457 0.6937 0.7077 0.7136
#> visual~~visual   1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual~~textual 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed~~speed     1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual~~textual  0.4585 0.0710 100 0.2740 0.2810 0.2992 0.5867 0.6381 0.6400
#> visual~~speed    0.4705 0.0832 100 0.2320 0.2768 0.3297 0.6167 0.6644 0.6683
#> textual~~speed   0.2830 0.0681 100 0.1014 0.1067 0.1691 0.4154 0.4245 0.4267
#> Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals

#> test-semmcci-npd

#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> [[1]]
#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
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#>
#> [[1]][[2]]$visible
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#>
#>
#> [[1]][[3]]
#> [[1]][[3]]$value
#> [[1]][[3]]$value[[1]]
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#>
#>
#> [[1]][[3]]$visible
#> [1] TRUE
#>
#>
```

```
#> [[1]][[4]]
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#> [[1]][[4]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[4]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[5]]
#> [[1]][[5]]$value
#> [[1]][[5]]$value[[1]]
#> Monte Carlo Confidence Intervals
#>                               est       se       R     0.05%      0.5%      2.5%
#> ses=~sei                   5.2195   0.4255   20000    3.8228    4.1125    4.3786
#> alien67=~powerless67       0.9787   0.0615   20000    0.7757    0.8186    0.8597
#> alien71=~powerless71       0.9221   0.0595   20000    0.7226    0.7701    0.8062
#> alien71~alien67            0.6070   0.0508   20000    0.4398    0.4747    0.5062
#> alien71~ses               -0.2268   0.0522   20000   -0.4001   -0.3604   -0.3294
#> alien67~ses               -0.5750   0.0566   20000   -0.7506   -0.7194   -0.6855
#> anomia67~~anomia71         1.6229   0.3131   20000    0.6073    0.8294    1.0096
#> powerless67~~powerless71   0.3387   0.2613   20000   -0.5144   -0.3315   -0.1766
#> education~~education       2.8013   0.5081   20000    1.1664    1.4804    1.7913
#> sei~~sei                 264.5971  18.0802   20000  206.5723  218.2530  228.8190
#> anomia67~~anomia67         4.7307   0.4546   20000    3.2544    3.5380    3.8492
#> powerless67~~powerless67   2.5634   0.4041   20000    1.2086    1.5219    1.7701
#> anomia71~~anomia71         4.3992   0.5135   20000    2.7609    3.0748    3.3954
#> powerless71~~powerless71   3.0699   0.4344   20000    1.6362    1.9146    2.2136
#> ses~~ses                   6.7983   0.6507   20000    4.7564    5.1202    5.5414
#> alien67~~alien67           4.8415   0.4614   20000    3.3593    3.6506    3.9426
#> alien71~~alien71           4.0832   0.4054   20000    2.6931    3.0453    3.2753
#>                             97.5%     99.5%    99.95%
#> ses=~sei                   6.0558    6.3029    6.5990
#> alien67=~powerless67       1.1002    1.1374    1.1826
#> alien71=~powerless71       1.0399    1.0772    1.1155
#> alien71~alien67            0.7053    0.7352    0.7655
#> alien71~ses               -0.1247   -0.0932   -0.0605
#> alien67~ses               -0.4638   -0.4276   -0.3885
#> anomia67~~anomia71         2.2439    2.4214    2.6103
#> powerless67~~powerless71   0.8456    1.0011    1.1671
#> education~~education       3.7922    4.1009    4.5158
#> sei~~sei                 299.9977  310.6247  321.9617
#> anomia67~~anomia67         5.6243    5.9003    6.1896
#> powerless67~~powerless67   3.3471    3.6110    3.8486
```

```
#> anomia71~~anomia71       5.4106    5.7222    6.1345
#> powerless71~~powerless71 3.9321    4.1763    4.4709
#> ses~~ses                 8.0707    8.4749    8.8686
#> alien67~~alien67         5.7375    6.0106    6.3277
#> alien71~~alien71         4.8670    5.1226    5.4000
#>
#>
#> [[1]][[5]]$visible
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#>
#> [[1]][[6]]
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#>
#> [[1]][[6]]$visible
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#>
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#>
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#>
#>
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#>
#>
#> [[1]][[9]]
#> [[1]][[9]]$value
#> [[1]][[9]]$value[[1]]
#> [1] TRUE
#>
```

```
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#> [[1]][[9]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#>          est     se    R    0.05%     0.5%     2.5%   97.5%   99.5%  99.95%
#> cp    -0.0194 0.0318 2000 -0.1228 -0.1059 -0.0819 0.0441 0.0576 0.0824
#> b      0.0785 0.0321 2000 -0.0281 -0.0060  0.0156 0.1449 0.1640 0.1892
#> a      0.1115 0.0313 2000  0.0212  0.0315  0.0490 0.1711 0.1956 0.2052
#> y~~y   0.9938 0.0055 2000  0.9610  0.9713  0.9780 0.9991 0.9997 1.0000
#> m~~m   0.9876 0.0071 2000  0.9579  0.9617  0.9707 0.9976 0.9990 0.9995
#> x~~x   1.0000 0.0000 2000  1.0000  1.0000  1.0000 1.0000 1.0000 1.0000
#>
#>
#> [[1]][[10]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[11]]
#> [[1]][[11]]$value
#> [[1]][[11]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[11]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[12]]
#> [[1]][[12]]$value
#> [[1]][[12]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[12]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[13]]
#> [[1]][[13]]$value
#> [[1]][[13]]$value[[1]]
#> [1] TRUE
#>
```

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#> 
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#> 
#> [[1]][[14]]
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#> 
#> 
#> [[1]][[14]]$visible
#> [1] TRUE
#> 
#> 
#> [[1]][[15]]
#> [[1]][[15]]$value
#> [[1]][[15]]$value[[1]]
#>                           2.5%      97.5%
#> visual=~x2           0.2593765 0.5616462
#> visual=~x3           0.4564486 0.6834557
#> textual=~x5          0.8066400 0.8892373
#> textual=~x6          0.8028245 0.8789601
#> speed=~x8            0.6165011 0.8108924
#> speed=~x9            0.5534481 0.7444650
#> x1~~x1               0.2361037 0.5874639
#> x2~~x2               0.6844453 0.9327224
#> x3~~x3               0.5327139 0.7916220
#> x4~~x4               0.2040812 0.3459528
#> x5~~x5               0.2092569 0.3493190
#> x6~~x6               0.2274256 0.3554721
#> x7~~x7               0.5386584 0.8013181
#> x8~~x8               0.3424528 0.6195921
#> x9~~x9               0.4457238 0.6936716
#> visual~~visual    1.0000000 1.0000000
#> textual~~textual 1.0000000 1.0000000
#> speed~~speed      1.0000000 1.0000000
#> visual~~textual   0.2991792 0.5866547
#> visual~~speed     0.3296832 0.6166535
#> textual~~speed    0.1690983 0.4154413
#> 
#> 
#> [[1]][[15]]$visible
#> [1] TRUE
#> 
#> 
```

```
#> [[1]][[16]]
#> [[1]][[16]]$value
#> [[1]][[16]]$value[[1]]
#> [[1]][[16]]$value[[1]]$thetahatstar
#>                   y1              y2              y3
#>    [1,] -1.393306131 -3.8505629382 -3.8743255422
#>    [2,] -0.304832812 -1.2820864596 -1.0916246059
#>    [3,] -1.178133372 -1.7950031603 -2.4652598864
#>    [4,]  1.026230404  1.5926341614  2.1635336613
#>    [5,]  0.507710205  2.0715275836  1.7827153481
#>    [6,] -0.510628943 -2.1231571998 -1.8150072307
#>    [7,] -0.293044545  0.1819481633 -0.2644469579
#>    [8,] -0.298189622 -1.0359253953 -0.9467315992
#>    [9,]  0.384136944  0.3386499722  0.6669474902
#>   [10,] -1.337733231 -1.5520152021 -2.5294295120
#>   [11,]  0.320928404 -1.3380515723 -0.3423714269
#>   [12,]  0.071882900  1.6117451346  0.9840875792
#>   [13,]  0.956765366  1.2316775193  1.8765963527
#>   [14,]  1.267678736  2.4383621474  2.9339584302
#>   [15,] -0.546186736 -0.3653954081 -0.8838628728
#>   [16,]  0.568723606 -0.0043060741  0.7067970465
#>   [17,] -0.495249087  0.5287438772 -0.3241347959
#>   [18,]  2.043989285  3.4026400106  4.4371356934
#>   [19,]  0.656303590  0.4599000692  1.0736224734
#>   [20,]  1.270567089  1.4117593107  2.3678385558
#>   [21,]  1.465249942  2.9659107556  3.4730930849
#>   [22,]  1.647014738  3.2495796864  3.8571744583
#>   [23,]  1.791476675  2.3806593043  3.5551011143
#>   [24,]  0.574212544 -0.4046958762  0.4914420627
#>   [25,]  1.375400861  0.6362202861  2.0681724417
#>   [26,] -0.113687291  0.5286267641  0.1515999884
#>   [27,] -0.119866200  0.4874060456  0.1210192422
#>   [28,]  0.528102969  1.8061510875  1.6608718648
#>   [29,] -0.138151505  0.3164536760  0.0033464314
#>   [30,] -1.753448301 -3.6977194734 -4.2385937588
#>   [31,] -1.092867049 -1.7105900743 -2.3120887923
#>   [32,] -0.713140968 -1.2917692370 -1.6061500844
#>   [33,]  1.223452102  2.1252885183  2.7050659639
#>   [34,] -0.159009532  0.0706220525 -0.1590893615
#>   [35,]  0.746098786  1.5282304153  1.7784738649
#>   [36,]  0.799129518  0.5120811424  1.2806818034
#>   [37,] -0.759564832 -0.8869492743 -1.4393815653
#>   [38,]  0.372269985  0.4506731571  0.7143178119
#>   [39,] -0.226976439 -0.7052699747 -0.6744302975
#>   [40,] -0.981346678 -2.5351277325 -2.6306090428
```

```
#>    [41,]  0.997386130  2.1824193407  2.4548715215
#>    [42,]  0.505520397  1.4648202075  1.4432875106
#>    [43,]  0.668592989  0.8324504423  1.2956969635
#>    [44,] -0.076607998  1.0935592292  0.5113509756
#>    [45,]  0.083784862  1.1464096032  0.7406873466
#>    [46,] -1.304915860 -1.9250335287 -2.6955164733
#>    [47,] -0.641950380 -1.4679458311 -1.6151475073
#>    [48,] -0.981752921 -1.7905765686 -2.2179208967
#>    [49,] -0.082412081  0.4904711724  0.1694247818
#>    [50,]  0.104083011  0.0216761793  0.1418187637
#>    [51,]  1.012249594  2.2848123229  2.5302297759
#>    [52,] -0.257857874 -0.3202742973 -0.4992823350
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#> [1347,]  -1.276739549 -2.9579855269  -3.2336262996
#> [1348,]   0.346095440 -0.6687360349   0.0604534532
#> [1349,]  -0.990165708 -2.3755761695  -2.5530617563
#> [1350,]   1.175674224  0.1605580993   1.5551448003
#> [1351,]   0.351105284 -0.3713463445   0.2317394541
#> [1352,]  -0.307111813 -1.2039983183  -1.0511308243
#> [1353,]   0.728512968  0.2756247105   1.0614009863
#> [1354,]  -0.312524141  0.5340938691  -0.0933114933
#> [1355,]   3.338511922  6.6822696568   7.8714361603
#> [1356,]  -0.358880013 -1.1174411608  -1.0676491157
#> [1357,]  -0.279383669 -0.8643348780  -0.8280554060
#> [1358,]   0.876259709  2.1879972286   2.3069248402
#> [1359,]   1.289319353  2.3771938804   2.9269980109
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#> [1361,]  -2.206544526 -1.5742505929  -3.6251591875
#> [1362,]   1.409661860  2.5312790644   3.1625734888
#> [1363,]   0.008503716  0.0958937510   0.0638209768
#> [1364,]   0.739145522  1.2461846708   1.6132797073
#> [1365,]  -1.364776956 -2.6357260528  -3.1645666341
#> [1366,]  -1.407982920 -2.9568768295  -3.3966688263
#> [1367,]  -0.683864750 -1.3108338869  -1.5802233201
#> [1368,]   2.279872960  3.1705849333   4.6024969728
#> [1369,]  -0.465810810 -0.2592451860  -0.7247268035
#> [1370,]   0.683342158  0.6584195100   1.2175089944
#> [1371,]   0.867012246  1.1768519249   1.7342501334
#> [1372,]  -0.213553813 -0.5898479361  -0.5936381585
#> [1373,]  -1.184765306 -1.3911158694  -2.2493892357
#> [1374,]  -1.299779450 -1.4558631261  -2.4287415444
#> [1375,]  -0.426886890 -1.1654464673  -1.1790932395
#> [1376,]   0.012912794 -0.1623767253  -0.0740102932
#> [1377,]   0.487580872  0.7906460043   1.0467788328
#> [1378,]  -1.147302148 -3.2768744981  -3.2491905281
#> [1379,]  -1.425542678 -1.6408904779  -2.6882481586
#> [1380,]   1.667644224  2.0726190248   3.2297351162
#> [1381,]  -0.002714031  0.1968984783   0.1058860709
#> [1382,]   0.132146614 -0.8137834799  -0.2868316274
#> [1383,]   0.146875379 -0.5564012514  -0.1256287977
#> [1384,]   0.045529111 -0.5488558905  -0.2478181668
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#> [1386,]  -1.872851410 -3.9905762972  -4.5500102767
#> [1387,]   0.491176890  1.1308201923   1.2400454255
#> [1388,]   0.173717534 -0.2903746345   0.0554764574
#> [1389,]  -0.593222427 -1.6116916724  -1.6341576671
#> [1390,]   0.435170112  0.9661129351   1.0788004841
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#> [1391,]  0.372256065  1.2817670796  1.1755227849
#> [1392,] -1.689367960 -1.7575007122 -3.0819467011
#> [1393,] -0.464817986  0.3251050471 -0.3991988582
#> [1394,]  0.698407499  0.4832038656  1.1390578216
#> [1395,] -0.420347065 -1.0805812035 -1.1238415430
#> [1396,] -0.189141745  0.9300391054  0.2802768670
#> [1397,]  0.444174600  1.1242552946  1.1777912855
#> [1398,]  0.477199890  0.3197435769  0.7725028280
#> [1399,]  0.517693430  0.1450965407  0.7260756530
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#> [1401,]  0.236902333 -0.8151845480 -0.1569809162
#> [1402,] -2.315399523 -3.8712426287 -5.0356335574
#> [1403,] -1.747570054 -2.9329627197 -3.8068557252
#> [1404,]  1.057247707  2.5926537244  2.7571805945
#> [1405,]  1.896417205  3.8684160084  4.5116024968
#> [1406,]  0.322614602 -0.0362648149  0.3821683752
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#> [1431,] -0.272454553 -0.2312047825 -0.4680542452
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#> [1435,] -1.271152314 -2.3196801676 -2.8724263821
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#> [1436,]  -0.049502577  -0.4837694105  -0.3302004727
#> [1437,]  -0.194335458  -0.6996839072  -0.6306276260
#> [1438,]   0.788656108   1.6596701381   1.9044855209
#> [1439,]  -0.067423586  -0.4486676355  -0.3330675896
#> [1440,]   2.330381026   4.1651647255   5.2174296438
#> [1441,]  -0.682161116  -1.1106629535  -1.4670124364
#> [1442,]   0.044601997   0.1761169632   0.1533553215
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#> [1444,]   0.846502445  -0.3344309806   0.8699760910
#> [1445,]   0.139283289  -0.4815020512  -0.0935300580
#> [1446,]  -0.119065499  -0.8372169224  -0.6130925884
#> [1447,]  -0.364685905  -0.5644538832  -0.7680041576
#> [1448,]   0.790084934   2.3697824568   2.3003498442
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#> [1456,]  -1.503907245  -1.2771213850  -2.5840905587
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#> [1458,]  -1.432077776  -3.5475751839  -3.7545274752
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#> [1472,]  -0.362818063  -0.8611986184  -0.9303559010
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#> [1475,]  -0.947849921  -0.6405659348  -1.5374367932
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#> [1480,]   0.717310759   0.5204755617   1.1833140316
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#> [1481,]  0.113452483  1.0411806865  0.7192846218
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#> [1492,]  3.215576346  5.2125787585  6.9025210888
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#> [1494,] -0.348934310 -0.2819823301 -0.5916023553
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#> [1498,] -1.241189176 -3.0007142381 -3.2130083551
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#> [1501,] -1.039633916 -2.3712411665 -2.6123418565
#> [1502,] -0.568401676 -2.3601028137 -2.0185435457
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#> [1506,]  0.427747360  0.3839981685  0.7464951402
#> [1507,]  0.229777679  0.2361552918  0.4175843791
#> [1508,]  0.433758769  1.4487814678  1.3449013946
#> [1509,]  0.446742238 -0.1233343416  0.4886330629
#> [1510,] -0.835422047 -1.3283630249 -1.7789401159
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#> [1512,] -1.552357240 -1.8372982415 -2.9553814164
#> [1513,]  0.731742762  1.6149874906  1.8087187410
#> [1514,] -1.114319844 -1.0640306601 -1.9800265854
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#> [1519,] -1.175750206 -1.0167657491 -2.0303989468
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#> [1528,]  -3.191208334  -5.5031979903  -7.0334161812
#> [1529,]   0.931357947   1.4948442218   1.9909603212
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#> [1531,]  -1.192438812  -3.0129575405  -3.1590121654
#> [1532,]   0.758205876   2.7300351933   2.4605224948
#> [1533,]   1.578166573   2.5958022122   3.4085030745
#> [1534,]  -0.141176224  -0.3719487607  -0.3824598609
#> [1535,]   1.345229984   1.5187330334   2.5203076003
#> [1536,]   0.789896629   2.0840246800   2.1415314284
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#> [1543,]  -0.591329568   0.0314544626  -0.7199200009
#> [1544,]  -0.401664787  -1.5169503363  -1.3427117215
#> [1545,]  -0.419257996  -0.6327930556  -0.8739798224
#> [1546,]  -0.957974709  -1.8660975970  -2.2301809602
#> [1547,]   0.481735420  -0.9421118345   0.0778816191
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#> [1549,]  -0.614391225   0.0718748447  -0.7262457973
#> [1550,]  -1.148067011  -1.1790074978  -2.0859159450
#> [1551,]   0.149870662   0.1278412054   0.2578321753
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#> [1557,]  -0.701962697  -1.6956662316  -1.8163569308
#> [1558,]   1.716406900   2.5107582505   3.5336901051
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#> [1607,]  -0.847319729 -1.7069833879 -2.0038947319
#> [1608,]   1.462286648  3.4946298712  3.7628148906
#> [1609,]  -2.367667925 -5.2280114924 -5.8537611029
#> [1610,]  -1.042722365 -1.8618969645 -2.3335283836
#> [1611,]   0.339182895  1.1732102148  1.0740367016
#> [1612,]   3.383395955  5.6309977056  7.3439937157
#> [1613,]   0.957979086  1.4727704027  2.0119062924
#> [1614,]  -0.116931991  1.1289796035  0.4807246046
#> [1615,]   1.036573199  1.1354206541  1.9226965617
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#> [1616,] -0.313187695 -0.1924013860 -0.4973133811
#> [1617,] -0.963972672 -1.3988043199 -1.9783320936
#> [1618,] -0.544990236 -1.2534043248 -1.3751786308
#> [1619,]  1.038717595  1.8156570513  2.3028733002
#> [1620,] -0.650089925 -2.3616484131 -2.1212648690
#> [1621,]  0.186356872 -0.0427177633  0.2086766480
#> [1622,] -0.715101258 -2.4325186214 -2.2416626734
#> [1623,] -0.019522316 -0.1334438678 -0.0983996894
#> [1624,]  0.563797225  0.9383127598  1.2237679370
#> [1625,] -0.688094342 -1.3345419800 -1.5986545338
#> [1626,]  1.580974897  2.7442114011  3.4943658838
#> [1627,]  0.315211039  0.8219565164  0.8492131893
#> [1628,]  0.037673910  0.5644685901  0.3602350321
#> [1629,]  1.820256653  2.8915448995  3.8745092766
#> [1630,] -2.520879078 -4.0089737968 -5.3682974036
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#> [1644,]  2.745281318  5.4898758508  6.4699610571
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#> [1646,]  1.636399203  2.2346076579  3.2806701209
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#> [1651,] -0.006060748 -1.8674332304 -1.0439048862
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#> [1655,] -1.110939712 -1.8555991286 -2.4150989883
#> [1656,] -1.994649288 -4.0423301252 -4.7306109546
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#> [1659,]  1.132481617  2.1842141264  2.6243288691
#> [1660,] -0.627383910 -1.2748099166 -1.4898010698
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#> [1661,]   0.038607156 -0.3018556253 -0.1193748984
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#> [1665,] -1.385302691 -2.7484241670 -3.2527045429
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#> [1668,] -0.353976096 -1.0789927445 -1.0401967700
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#> [1677,] -1.169138607 -2.0279049430 -2.5832943361
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#> [1705,] -1.246389100 -2.1280410857 -2.7351954916
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#> [1706,]  -0.039490256  -0.6646066099  -0.4180723868
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#> [1709,]  -1.806402899  -3.0422777015  -3.9408843214
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#> [1714,]   1.238724845   1.8004675176   2.5438487072
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#> [1732,]  -0.638387059  -1.0606157032  -1.3846529512
#> [1733,]   0.148747034   0.1892446119   0.2905073538
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#> [1740,]   0.840605284   1.6420724243   1.9594990895
#> [1741,]  -0.145220843   0.1736224556  -0.0847342356
#> [1742,]  -0.730724607  -1.5222410957  -1.7559787554
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#> [1745,]  -1.029275669  -2.0371733807  -2.4140317005
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#> [1751,] -0.780040121  0.5355273340 -0.6754988724
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#> [1753,]  0.022644976  1.4502502564  0.8330659970
#> [1754,] -0.873917035 -0.7407890041 -1.5008635994
#> [1755,]  0.003063964  0.2095961877  0.1201378089
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#> [1760,] -0.247073956 -0.1650193986 -0.3996750406
#> [1761,] -0.151186431 -1.4558240571 -0.9964477946
#> [1762,]  0.680373819 -0.0909362376  0.7979464707
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#> [1764,] -1.207149859 -1.9594346902 -2.5926954687
#> [1765,] -0.900468507 -1.7580046174 -2.0984848204
#> [1766,] -1.581692819 -3.0716068676 -3.6769518949
#> [1767,]  0.832405269  0.9656195699  1.5738708249
#> [1768,]  1.035927617  1.5535673438  2.1539454409
#> [1769,]  0.681733874  1.8627344195  1.8838478500
#> [1770,] -0.118834443  1.0345976426  0.4259742485
#> [1771,]  1.358403710  2.2381131314  2.9359608032
#> [1772,] -0.513812022 -1.1887220730 -1.3004040925
#> [1773,] -0.966214903 -1.6769336644 -2.1354782514
#> [1774,] -0.358740437 -1.8739759765 -1.4873202159
#> [1775,]  1.240530306  2.0566752937  2.6882846687
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#> [1778,]  0.119723985  0.3693756396  0.3542813826
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#> [1786,]  1.685637347  2.3065992365  3.3820213948
#> [1787,] -1.896378380 -3.9893950540 -4.5786923876
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#> [1796,]  -0.685357943 -1.7223039806 -1.8104339767
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#> [1814,]  -1.703659793 -3.3805087976 -4.0004698617
#> [1815,]   0.903772231  1.0080854533  1.6864307585
#> [1816,]   0.521988188  0.7637353229  1.0747497524
#> [1817,]   0.676402570  0.3789579353  1.0537659968
#> [1818,]   1.156385220  2.1686008638  2.6454714675
#> [1819,]   0.513155150  0.9440337572  1.1637932158
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#> [1821,]   0.057548455 -0.0859722389  0.0240507564
#> [1822,]  -0.816942464 -1.6868750908 -1.9548556397
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#> [1824,]   0.699495289  1.0897525591  1.4770234030
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#> [1841,]   0.338859927   0.5908175856   0.7504304408
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#> [1850,]   0.835991794   2.3103525580   2.3246136555
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#> [1866,]  -0.865853736  -0.9035837381  -1.5811530918
#> [1867,]   1.931373766   3.1073172918   4.1328146928
#> [1868,]  -1.057130606  -1.3173551824  -2.0492972753
#> [1869,]   0.358281374   0.4679425300   0.7064580776
#> [1870,]  -1.242898109  -2.0044622432  -2.6622612140
#> [1871,]   0.149564940   0.6921404383   0.5706133950
#> [1872,]  -0.426471901  -1.1855524580  -1.1897337401
#> [1873,]  -0.771687953  -0.4627681296  -1.2190960750
#> [1874,]  -1.599921420  -2.1992863381  -3.2155812163
#> [1875,]   1.358800969   1.4427627562   2.4950700182
#> [1876,]  -2.094607512  -2.3925193301  -3.9396809038
#> [1877,]  -0.979602589  -1.5410785688  -2.0767785316
#> [1878,]   2.818596019   3.9459181687   5.7045511236
#> [1879,]  -2.254966693  -3.0893091356  -4.5263347001
#> [1880,]  -1.442998610  -3.1985195724  -3.5744342819
#> [1881,]  -0.145264037   0.1552265680  -0.0949970456
#> [1882,]   1.254790301   1.4960824975   2.3949610609
#> [1883,]   0.581221193   0.3423285426   0.9147489810
#> [1884,]  -0.515765253  -0.5439965923  -0.9450440840
#> [1885,]   0.370937375   0.3442992223   0.6536229939
```

```
#> [1886,] -2.367002194 -2.4000316298 -4.2835205285
#> [1887,] -1.796847293 -3.2630212560 -4.0514721072
#> [1888,] -1.216929367 -1.6952435757 -2.4582753084
#> [1889,] -0.989269389 -1.1898089343 -1.8938928939
#> [1890,]  0.196429927  0.7621272089  0.6678928048
#> [1891,] -0.443141670 -0.5703935958 -0.8691331880
#> [1892,] -0.585906707 -0.7233793042 -1.1320589404
#> [1893,] -1.426734335 -3.5526709722 -3.7506922623
#> [1894,]  0.217963169  0.4908575241  0.5442010008
#> [1895,] -0.013287029 -0.8192388133 -0.4712118960
#> [1896,]  1.731884706  3.1992593301  3.9350798860
#> [1897,]  0.615697751  1.0489198279  1.3498691263
#> [1898,]  1.070363337  3.1523765717  3.0841582642
#> [1899,]  1.665657133  3.1015589155  3.7982758144
#> [1900,] -2.243598339 -3.7986109553 -4.9057914086
#> [1901,] -1.844818149 -3.2976153100 -4.1304890373
#> [1902,]  1.712815381  2.5856976107  3.5707997617
#> [1903,] -1.627929545 -2.9513491041 -3.6678701247
#> [1904,] -0.930267947 -1.1779330207 -1.8137286648
#> [1905,]  0.183812135 -0.4811513900 -0.0378088936
#> [1906,] -0.301237587 -1.9521876814 -1.4590195556
#> [1907,] -2.991221801 -5.6392249473 -6.8595263192
#> [1908,]  1.228296877  2.9361798776  3.1611180538
#> [1909,]  0.499576989  0.7663833463  1.0482729865
#> [1910,] -1.497028405 -2.2846330544 -3.1346395799
#> [1911,] -1.478113002 -2.7263081428 -3.3561636404
#> [1912,]  1.234288547  1.1732010048  2.1902100811
#> [1913,]  0.766860159  0.3661330179  1.1594474731
#> [1914,]  1.319161993  2.7228284498  3.1560238895
#> [1915,] -0.663434417 -1.9904317626 -1.9318954789
#> [1916,] -1.241028390 -3.0968802516 -3.2661759697
#> [1917,] -1.204008274 -1.6992310546 -2.4443758520
#> [1918,] -0.820517967 -1.0183412437 -1.5883059237
#> [1919,] -0.052977251 -0.5387617283 -0.3650517541
#> [1920,] -0.124941227 -0.0568723292 -0.1873609237
#> [1921,] -0.092968553 -0.5629154043 -0.4283243703
#> [1922,] -0.341922865 -1.0361319115 -1.0013806684
#> [1923,] -1.443923283 -3.4735751869 -3.7282316809
#> [1924,]  0.178554438  0.4210670434  0.4563283221
#> [1925,] -0.246443577  0.1326620055 -0.2336882553
#> [1926,]  1.501108245  2.2856354606  3.1402833508
#> [1927,] -0.979556456 -1.5522049524 -2.0828956829
#> [1928,] -0.489788643 -1.3574700403 -1.3640954861
#> [1929,]  0.896063042  1.9361782755  2.1918702159
#> [1930,]  0.577006377  0.1270862912  0.7900427543
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#> [1931,]   2.190560076   2.4823502005   4.1091841659
#> [1932,]  -2.146784462  -2.7097216338  -4.1807784936
#> [1933,]  -0.795441034  -2.1565612705  -2.1886999595
#> [1934,]   0.364600601  -0.0150454902   0.4462998960
#> [1935,]  -1.222008642  -1.9309430280  -2.5954123886
#> [1936,]  -1.210491368  -1.1095569033  -2.1252156724
#> [1937,]   1.126092636   2.6808161381   2.8919552657
#> [1938,]   0.710919779   2.5674792451   2.3113459507
#> [1939,]  -1.031055420  -1.2497892340  -1.9792857775
#> [1940,]  -1.254526625  -2.7797535972  -3.1070159779
#> [1941,]   0.331251020   1.1498538551   1.0511840137
#> [1942,]  -0.501194924  -1.2431972623  -1.3149022781
#> [1943,]   0.120597180  -1.2164339935  -0.5246877130
#> [1944,]   0.751809013   1.0113753360   1.4987614721
#> [1945,]   0.729037330   2.3867442722   2.2336378238
#> [1946,]  -0.710969570  -2.0527808424  -2.0257719744
#> [1947,]   0.495172749   0.6363283137   0.9706058910
#> [1948,]   0.048112994  -0.0341277068   0.0410564742
#> [1949,]  -0.655289925  -1.8591588182  -1.8488884766
#> [1950,]   2.135011109   3.2020346561   4.4393104789
#> [1951,]  -1.213025060  -2.8843420489  -3.1133065838
#> [1952,]   0.902187892   2.0810393350   2.2798996018
#> [1953,]   0.896729640   2.0608745863   2.2619026821
#> [1954,]   0.386516562   0.7030909592   0.8721643144
#> [1955,]   0.146169717   0.1443901324   0.2624011340
#> [1956,]   0.332878234  -0.3730609639   0.2080591528
#> [1957,]  -0.659118242  -0.3844868935  -1.0352811322
#> [1958,]  -0.532396623  -1.4824320895  -1.4865754732
#> [1959,]  -1.636662923  -2.7293608616  -3.5555662883
#> [1960,]   0.534490032   0.0776441875   0.7095874410
#> [1961,]  -0.053327139  -0.7336682898  -0.4736530379
#> [1962,]  -0.096788019   0.5409133531   0.1794915779
#> [1963,]   0.065612579   0.1184949503   0.1475772835
#> [1964,]  -0.041313370  -0.1154779630  -0.1156023644
#> [1965,]   0.179929276   0.9060890951   0.7272096486
#> [1966,]   1.120836103   1.7799667652   2.3854667913
#> [1967,]  -1.043117478  -0.8884714027  -1.7938106491
#> [1968,]   2.884626775   3.6010899855   5.5955249246
#> [1969,]  -0.244409582  -0.3947123810  -0.5238226098
#> [1970,]  -0.139737329   0.2351718930  -0.0437390450
#> [1971,]   1.657380822   2.9190322920   3.6866607893
#> [1972,]  -1.804673642  -3.1322925058  -3.9886824207
#> [1973,]   1.221277358   2.3013870375   2.8000814077
#> [1974,]  -0.668636995  -1.4994121381  -1.6658876547
#> [1975,]   0.134813368  -0.7292690602  -0.2366042749
```

```
#> [1976,]   1.855003429   1.7159118904   3.2654106984
#> [1977,]   1.063570312   2.7859322582   2.8723262487
#> [1978,]   1.177507291   2.6837771034   2.9577115038
#> [1979,]   1.005967729   2.0243816595   2.3778683044
#> [1980,]  -0.518303675  -0.3575265024  -0.8447263512
#> [1981,]   0.562227138   0.1292218115   0.7727984685
#> [1982,]  -0.936709200  -1.3191937470  -1.9001545644
#> [1983,]  -0.067783453   0.1246668388  -0.0153397079
#> [1984,]  -0.278953772   0.1721013690  -0.2523406096
#> [1985,]  -0.548393851  -0.2813374589  -0.8399664578
#> [1986,]   0.948075010   0.9639092300   1.7171594666
#> [1987,]   0.965128143   1.7884122537   2.1959890327
#> [1988,]   0.153511828  -0.5971026899  -0.1399408755
#> [1989,]   0.201096333   0.0347522804   0.2700490860
#> [1990,]   0.794291544   1.7763913749   1.9762881944
#> [1991,]  -2.499939900  -5.1358118769  -5.9675346317
#> [1992,]   0.535044612  -0.2858700082   0.5085438327
#> [1993,]  -1.346794575  -1.6749846788  -2.6089717342
#> [1994,]   1.260567995   2.2912511466   2.8434510352
#> [1995,]   1.708244316   3.9641278832   4.3300708259
#> [1996,]   0.598486196   1.3545566679   1.4980223175
#> [1997,]  -1.025379374  -1.5391472513  -2.1327894491
#> [1998,]  -0.621996452  -0.4929669043  -1.0491928813
#> [1999,]   0.389708941   0.5626934050   0.7982303820
#> [2000,]   1.299641995   2.4951989244   3.0053579938
#>
#> [[1]][[16]]$value[[1]]$decomposition
#> [1] "eigen"
#>
#>
#>
#> [[1]][[16]]$visible
#> [1] TRUE
```

Environment

```
ls()

#> [1] "i"        "root"      "tex_file"
```

Class

```
#> [[1]]
#> [1] "character"
#>
#> [[2]]
#> [1] "root_criterion"
#>
#> [[3]]
#> [1] "character"
```

References

R Core Team. (2023). *R: A language and environment for statistical computing.* R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/