semmcci: Internal Tests

Ivan Jacob Agaloos Pesigan

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 0.0319 2000 -0.1248 -0.1017 -0.0849 0.0410 0.0621 0.0865
#> b     0.0817 0.0334 2000 -0.0249 -0.0011  0.0180 0.1503 0.1690 0.1927
#> a     0.1098 0.0313 2000 -0.0008  0.0315  0.0510 0.1694 0.1921 0.2151
#> y~~y  1.0476 0.0453 2000  0.9064  0.9347  0.9597 1.1354 1.1649 1.1817
#> m~~m  0.9615 0.0435 2000  0.8062  0.8382  0.8760 1.0452 1.0752 1.0999
#> x~~x  1.0040 0.0458 2000  0.8603  0.8929  0.9170 1.0930 1.1262 1.1486
#> y~1  -0.0038 0.0322 2000 -0.1040 -0.0866 -0.0677 0.0602 0.0759 0.0925
#> m~1  -0.0050 0.0308 2000 -0.0986 -0.0850 -0.0636 0.0536 0.0739 0.0980
#> x~1  -0.0258 0.0325 2000 -0.1259 -0.1113 -0.0904 0.0374 0.0591 0.0874
#> Standardized Monte Carlo Confidence Intervals
#>          est     se    R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> cp   -0.0194 0.0311 2000 -0.1201 -0.0991 -0.0820 0.0406 0.0601 0.0864
#> b     0.0785 0.0320 2000 -0.0235 -0.0012  0.0174 0.1426 0.1633 0.1863
#> a     0.1115 0.0315 2000 -0.0007  0.0319  0.0520 0.1700 0.1951 0.2193
#> y~~y  0.9938 0.0054 2000  0.9634  0.9721  0.9787 0.9993 0.9998 1.0000
#> m~~m  0.9876 0.0072 2000  0.9519  0.9619  0.9711 0.9973 0.9990 1.0000
#> 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 0.1082 100 0.2546 0.2714 0.3458 0.7581 0.7924 0.8056
#> visual=~x3       0.7294 0.1117 100 0.4317 0.4701 0.5172 0.9242 0.9492 0.9537
#> textual=~x5      1.1131 0.0659 100 0.9399 0.9636 1.0087 1.2359 1.2488 1.2584
#> textual=~x6      0.9261 0.0585 100 0.7955 0.7973 0.8080 1.0249 1.0501 1.0551
#> speed=~x8        1.1800 0.1766 100 0.7415 0.7515 0.8319 1.4879 1.5684 1.6221
#> speed=~x9        1.0815 0.1450 100 0.7172 0.7223 0.7650 1.3327 1.3467 1.3503
#> x1~~x1           0.5491 0.1240 100 0.1411 0.1524 0.2988 0.7490 0.7751 0.7845
#> x2~~x2           1.1338 0.1042 100 0.9031 0.9080 0.9237 1.3455 1.3540 1.3560
#> x3~~x3           0.8443 0.0966 100 0.6410 0.6583 0.6903 1.0630 1.0883 1.0953
#> x4~~x4           0.3712 0.0462 100 0.2701 0.2716 0.2794 0.4469 0.4655 0.4783
#> x5~~x5           0.4463 0.0620 100 0.2944 0.3122 0.3413 0.5625 0.5828 0.5903
#> x6~~x6           0.3562 0.0428 100 0.2424 0.2497 0.2683 0.4229 0.4450 0.4462
#> x7~~x7           0.7994 0.0801 100 0.6113 0.6291 0.6613 0.9595 1.0020 1.0100
#> x8~~x8           0.4877 0.0784 100 0.2795 0.2937 0.3316 0.6217 0.6934 0.6982
#> x9~~x9           0.5661 0.0655 100 0.3790 0.3887 0.4459 0.6810 0.6919 0.6951
#> visual~~visual   0.8093 0.1496 100 0.5271 0.5364 0.5760 1.1599 1.2177 1.2467
#> textual~~textual 0.9795 0.1219 100 0.6899 0.7052 0.7480 1.1941 1.2913 1.3601
#> speed~~speed     0.3837 0.0880 100 0.1681 0.1825 0.2200 0.5351 0.6114 0.6362
#> visual~~textual  0.4082 0.0736 100 0.2258 0.2277 0.2654 0.5622 0.5746 0.5819
#> visual~~speed    0.2622 0.0522 100 0.1312 0.1341 0.1566 0.3520 0.3622 0.3704
#> textual~~speed   0.1735 0.0461 100 0.0697 0.0749 0.0889 0.2628 0.2786 0.2810
#> Standardized Monte Carlo Confidence Intervals
#>                     est     se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x2       0.4236 0.0597 100 0.2258 0.2463 0.2825 0.5033 0.5140 0.5190
#> visual=~x3       0.5811 0.0602 100 0.3760 0.3988 0.4648 0.6698 0.6904 0.7047
#> textual=~x5      0.8551 0.0222 100 0.8035 0.8050 0.8087 0.8915 0.8982 0.9013
#> textual=~x6      0.8380 0.0231 100 0.7771 0.7823 0.7913 0.8855 0.8881 0.8890
#> speed=~x8        0.7230 0.0539 100 0.5673 0.5712 0.6015 0.7985 0.8245 0.8306
#> speed=~x9        0.6650 0.0523 100 0.5518 0.5529 0.5577 0.7569 0.8002 0.8067
#> x1~~x1           0.4042 0.0913 100 0.1085 0.1202 0.2031 0.5429 0.5745 0.5965
#> x2~~x2           0.8206 0.0466 100 0.7307 0.7357 0.7467 0.9202 0.9388 0.9489
#> x3~~x3           0.6623 0.0676 100 0.5033 0.5232 0.5513 0.7839 0.8403 0.8585
#> x4~~x4           0.2748 0.0370 100 0.1889 0.1903 0.2122 0.3386 0.3534 0.3632
#> x5~~x5           0.2689 0.0379 100 0.1876 0.1933 0.2053 0.3460 0.3520 0.3543
#> x6~~x6           0.2977 0.0388 100 0.2097 0.2112 0.2159 0.3739 0.3880 0.3961
#> x7~~x7           0.6757 0.0596 100 0.5356 0.5501 0.5882 0.8074 0.8291 0.8400
#> x8~~x8           0.4772 0.0756 100 0.3101 0.3201 0.3623 0.6381 0.6737 0.6781
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#> x9~~x9          0.5578 0.0695 100 0.3492 0.3597 0.4270 0.6889 0.6943 0.6955
#> 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 0.0673 100 0.2858 0.2990 0.3167 0.5912 0.6091 0.6114
#> visual~~speed   0.4705 0.0763 100 0.3009 0.3131 0.3324 0.6295 0.6792 0.6974
#> textual~~speed  0.2830 0.0660 100 0.1442 0.1555 0.1712 0.4279 0.4586 0.4694
#> Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals

#> test-semmcci-npd

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

```
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#> [[1]][[4]]$value[[1]]
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#>
#>
#> [[1]][[4]]$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   0.4222 20000   3.8428   4.1454    4.4030
#> alien67=~powerless67          0.9787   0.0609 20000   0.7767   0.8203    0.8592
#> alien71=~powerless71          0.9221   0.0591 20000   0.7288   0.7701    0.8073
#> alien71~alien67               0.6070   0.0510 20000   0.4372   0.4787    0.5065
#> alien71~ses                  -0.2268   0.0519 20000  -0.3968  -0.3611   -0.3281
#> alien67~ses                  -0.5750   0.0568 20000  -0.7644  -0.7231   -0.6856
#> anomia67~~anomia71            1.6229   0.3119 20000   0.6127   0.8182    1.0007
#> powerless67~~powerless71      0.3387   0.2607 20000  -0.5061  -0.3271   -0.1714
#> education~~education          2.8013   0.5083 20000   1.1637   1.5014    1.8175
#> sei~~sei                    264.5971  18.1429 20000 204.5220 217.5003  228.7223
#> anomia67~~anomia67            4.7307   0.4520 20000   3.2141   3.5634    3.8482
#> powerless67~~powerless67      2.5634   0.3996 20000   1.3102   1.5373    1.7828
#> anomia71~~anomia71            4.3992   0.5126 20000   2.7245   3.0959    3.3907
#> powerless71~~powerless71      3.0699   0.4325 20000   1.6855   1.9422    2.2194
#> ses~~ses                      6.7983   0.6585 20000   4.5914   5.0733    5.4932
#> alien67~~alien67              4.8415   0.4675 20000   3.2856   3.6411    3.9184
#> alien71~~alien71              4.0832   0.4037 20000   2.7407   3.0335    3.2945
#>                               97.5%    99.5%   99.95%
#> ses=~sei                     6.0498   6.3360   6.6551
#> alien67=~powerless67         1.0980   1.1352   1.1742
#> alien71=~powerless71         1.0387   1.0738   1.1110
#> alien71~alien67              0.7080   0.7401   0.7821
#> alien71~ses                 -0.1242  -0.0931  -0.0617
#> alien67~ses                 -0.4640  -0.4265  -0.3901
#> anomia67~~anomia71           2.2313   2.4072   2.6656
#> powerless67~~powerless71     0.8526   0.9991   1.2036
#> education~~education         3.8036   4.1069   4.5869
#> sei~~sei                   299.6380 310.5472 322.8922
#> anomia67~~anomia67           5.6112   5.8993   6.2304
#> powerless67~~powerless67     3.3484   3.6132   3.8614
```

```
#> anomia71~~anomia71          5.4075  5.6952  6.0814
#> powerless71~~powerless71    3.9260  4.1836  4.4464
#> ses~~ses                    8.0862  8.4662  8.8360
#> alien67~~alien67            5.7521  6.0303  6.3329
#> alien71~~alien71            4.8772  5.1232  5.4709
#>
#>
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#> [1] TRUE
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#>
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#> [[1]][[6]]$visible
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#>
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#>
#> [[1]][[7]]$visible
#> [1] TRUE
#>
#>
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#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
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#>
#> [[1]][[8]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[9]]
#> [[1]][[9]]$value
#> [[1]][[9]]$value[[1]]
#> [1] TRUE
#>
```

```
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#> [[1]][[9]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#>          est     se    R    0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> cp    -0.0194 0.0311 2000 -0.1201 -0.0991 -0.0820  0.0406  0.0601  0.0864
#> b      0.0785 0.0320 2000 -0.0235 -0.0012  0.0174  0.1426  0.1633  0.1863
#> a      0.1115 0.0315 2000 -0.0007  0.0319  0.0520  0.1700  0.1951  0.2193
#> y~~y   0.9938 0.0054 2000  0.9634  0.9721  0.9787  0.9993  0.9998  1.0000
#> m~~m   0.9876 0.0072 2000  0.9519  0.9619  0.9711  0.9973  0.9990  1.0000
#> x~~x   1.0000 0.0000 2000  1.0000  1.0000  1.0000  1.0000  1.0000  1.0000
#>
#>
#> [[1]][[10]]$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]]
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#>
```

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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]]$value[[1]]
#>                          2.5%      97.5%
#> visual=~x2          0.2825355 0.5033195
#> visual=~x3          0.4648339 0.6698129
#> textual=~x5         0.8087257 0.8914827
#> textual=~x6         0.7912941 0.8854784
#> speed=~x8           0.6015466 0.7985354
#> speed=~x9           0.5577479 0.7568831
#> x1~~x1              0.2030554 0.5428538
#> x2~~x2              0.7466693 0.9201543
#> x3~~x3              0.5513437 0.7839078
#> x4~~x4              0.2122078 0.3386356
#> x5~~x5              0.2052584 0.3459628
#> x6~~x6              0.2159261 0.3738502
#> x7~~x7              0.5882044 0.8073989
#> x8~~x8              0.3623339 0.6381259
#> x9~~x9              0.4270235 0.6889148
#> visual~~visual      1.0000000 1.0000000
#> textual~~textual    1.0000000 1.0000000
#> speed~~speed        1.0000000 1.0000000
#> visual~~textual     0.3166541 0.5911886
#> visual~~speed       0.3323733 0.6294768
#> textual~~speed      0.1712234 0.4278857
#> 
#> 
#> [[1]][[15]]$visible
#> [1] TRUE
#> 
#> 
```

```
#> [[1]][[16]]
#> [[1]][[16]]$value
#> [[1]][[16]]$value[[1]]
#> [[1]][[16]]$value[[1]]$thetahatstar
#>                      y1            y2            y3
#>     [1,] -1.0224599377 -3.058060041 -2.9720819763
#>     [2,]  0.0615679412 -0.160091349 -0.0120700289
#>     [3,]  1.1461756196  2.666337921  2.9089635322
#>     [4,]  0.5693834956  0.889881906  1.2038568062
#>     [5,] -1.4724013317 -2.285296756 -3.1042984483
#>     [6,]  1.3882805382  2.387354184  3.0560391341
#>     [7,] -0.5571923713 -0.598706748 -1.0270647006
#>     [8,]  1.9836260300  3.430974531  4.3775884178
#>     [9,] -1.1726206390 -0.275525321 -1.6151390374
#>    [10,] -0.7496639197 -1.611031083 -1.8288704179
#>    [11,] -0.6983659782 -1.249932641 -1.5645084146
#>    [12,] -0.5604328551 -0.787339678 -1.1357888968
#>    [13,] -2.3963427328 -3.103395262 -4.7104449493
#>    [14,] -0.4175132805 -0.485288420 -0.7899453002
#>    [15,]  0.8796562791 -0.426349083  0.8603075475
#>    [16,]  0.2152841663  0.869667845  0.7510842071
#>    [17,]  1.1222001770  2.397159619  2.7296839566
#>    [18,]  0.7902496656  1.575038079  1.8595054053
#>    [19,] -0.1090701838  1.108469804  0.4791460372
#>    [20,] -0.4954717133 -1.269593977 -1.3224146226
#>    [21,] -1.2687566428 -2.414984624 -2.9223290114
#>    [22,]  0.4485443966  0.301206863  0.7264829119
#>    [23,] -0.2470738337  0.509437699 -0.0253794372
#>    [24,]  0.8647651683  1.129990922  1.7054421783
#>    [25,]  1.4807728948  2.209250166  3.0725349429
#>    [26,]  2.6074693705  3.971477449  5.4554648289
#>    [27,]  1.4811786046  2.091139539  3.0074944019
#>    [28,]  1.7813750525  1.932930195  3.2940336875
#>    [29,]  1.4324343358  2.055983778  2.9272013172
#>    [30,] -1.2635558109  0.030701690 -1.5585901718
#>    [31,]  1.3332892416  3.261521277  3.4725922456
#>    [32,] -0.0537568134 -0.802700457 -0.5124987962
#>    [33,] -1.7180601615 -1.676355727 -3.0726932222
#>    [34,] -1.3792974646 -1.860230055 -2.7523056022
#>    [35,]  1.3585530820  1.760494718  2.6710888441
#>    [36,]  0.1577030570  0.016020800  0.2055433687
#>    [37,]  1.5065932118  2.922971131  3.5008176053
#>    [38,]  0.3059999951  1.313507525  1.1105174350
#>    [39,]  0.7610101866  1.210522018  1.6207532191
#>    [40,] -1.1554218895 -1.451248396 -2.2461696289
```

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```
#>     [41,] -0.3642035129 -1.375776027 -1.2176524464
#>     [42,]  1.2323987777  1.289273154  2.2522687606
#>     [43,] -0.3206312862 -0.249832209 -0.5384670901
#>     [44,] -1.2253778742 -0.863662657 -2.0073178311
#>     [45,]  1.6468264205  1.816282733  3.0615198299
#>     [46,] -2.2521150413 -4.776129788 -5.4588935876
#>     [47,]  0.8869956374  1.027862624  1.6764861901
#>     [48,]  1.4759579659  2.808363306  3.3990135342
#>     [49,] -1.4612300906 -2.734876636 -3.3398661487
#>     [50,] -0.4952735204 -1.095225394 -1.2254002168
#>     [51,] -0.6411342747  1.025612984 -0.2303090977
#>     [52,]  2.9497809535  5.868373272  6.9350181536
#>     [53,] -0.7438440241 -0.801758440 -1.3725006928
#>     [54,] -0.5952143312 -0.821733033 -1.1982475601
#>     [55,] -1.7531961642 -2.065407844 -3.3324147373
#>     [56,]  1.2500715189  1.982979863  2.6592844881
#>     [57,]  0.0016536127 -0.748196824 -0.4131558902
#>     [58,] -2.3655260887 -5.047032871 -5.7506547194
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#> [1091,] -1.4810228167 -2.004796135 -2.9593831631
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#> [1102,] -1.4986990891 -1.802722616 -2.8692827721
#> [1103,]  0.4933318214  0.448616908  0.8641383206
#> [1104,]  0.5184681686 -0.479211331  0.3805770061
#> [1105,] -1.2006808061 -2.514651687 -2.8927508786
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#> [1116,]  2.2592800156  3.666726330  4.8521556934
#> [1117,] -0.9571459387 -2.198392991 -2.4135575310
#> [1118,] -2.5846892135 -4.936749644 -5.9627440923
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#> [1120,] -0.9220195279 -2.095427752 -2.3126142165
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#> [1126,]  -1.0447411271 -0.956993381  -1.8338621361
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#> [1132,]  -1.2528270554 -3.064687914  -3.2630232654
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#> [1349,]  -1.4898656697  -3.559030764  -3.8329451675
#> [1350,]   1.5606516462   2.179055921   3.1553855748
#> [1351,]   0.2758530508  -0.242890630   0.2091889976
#> [1352,]   0.2794070919   0.388420343   0.5639719727
#> [1353,]  -0.5355389233  -0.827626575  -1.1271042122
#> [1354,]   0.8164936055   1.950196880   2.1004284902
#> [1355,]  -0.9974128908  -2.303838055  -2.5222871949
#> [1356,]   0.7078214194   0.875555669   1.3685356118
#> [1357,]   0.4247430068   1.632126829   1.4354079227
#> [1358,]   0.3317947153   1.659327756   1.3345986747
#> [1359,]  -0.0418736300   0.562379241   0.2598813709
#> [1360,]  -0.3991059049  -0.053696086  -0.5274760029
#> [1361,]  -1.6898948624  -2.668511930  -3.5881768220
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#> [1365,]  -2.6433160042  -4.858753779  -5.9925660647
#> [1366,]   1.0189985932   0.568822988   1.5863434047
#> [1367,]  -0.2547737855  -0.863869404  -0.7971090648
#> [1368,]   0.3281414353   0.899294486   0.9082564649
#> [1369,]   0.5509604642   1.268478981   1.3909891871
#> [1370,]   1.1066407532   1.848443328   2.4057671042
#> [1371,]  -3.5923911769  -6.552740496  -8.1161351520
#> [1372,]   1.0566854207   2.445335132   2.6747237841
#> [1373,]  -1.0240966427  -2.228351266  -2.5136692820
#> [1374,]   2.6672115756   4.774818725   5.9757829141
#> [1375,]   0.5923768996   0.337875020   0.9261884013
#> [1376,]   1.2458888886   1.809435484   2.5577589690
#> [1377,]  -0.1753758883   0.912912384   0.2879379956
#> [1378,]   0.6285306370   1.543492686   1.6403387024
#> [1379,]  -0.2798567040  -1.224827391  -1.0287035230
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#> [1382,]  -1.4023193505  -1.295826323  -2.4677929835
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#> [1385,]  -0.4650614926  -0.682004749  -0.9584062774
#> [1386,]  -1.5180914210  -2.043386371  -3.0270229222
#> [1387,]   1.1379897151   0.224563707   1.5436734191
#> [1388,]  -0.6438180876  -1.279455831  -1.5128724418
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#> [1390,]   0.0407464528  -0.098623392  -0.0039218579
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#> [1391,] -0.1725617310 -0.023912910  0.2284516230
#> [1392,]  0.7998952876  2.715410748  2.5043923852
#> [1393,]  0.8336939400  0.374629447  1.2475029971
#> [1394,]  2.2327631049  2.524495012  4.1851990879
#> [1395,]  0.3942449697  0.512535796  0.7760513438
#> [1396,]  0.6416671687  1.614201612  1.6959601830
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#> [1398,]  1.3737083928  1.464636348  2.5257981991
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#> [1400,] -1.2102792442 -0.621059650 -1.8538556355
#> [1401,] -0.2310972540  0.022082844 -0.2759185085
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#> [1403,]  1.3167006583  1.270240740  2.3468292937
#> [1404,]  0.5292330540  1.233071154  1.3442456885
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#> [1406,]  0.0855108897  0.052928120  0.1360032261
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#> [1435,]  1.3096639215  2.991137730  3.2930804053
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#> [1499,]  -0.1118181168  -0.389441553  -0.3555586679
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#> [1501,]  -1.1265476266  -1.258863771  -2.1033985998
#> [1502,]   1.1948143676   2.313396730   2.7737474748
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#> [1608,]  -0.9691890625  -1.062573797  -1.7982429626
#> [1609,]  -1.2688962727  -2.700612869  -3.0810148448
#> [1610,]  -0.6913227824  -1.619503675  -1.7608221437
#> [1611,]  -0.7657536545  -0.608689242  -1.2926762336
#> [1612,]  -3.4327579818  -5.238295339  -7.1876137844
#> [1613,]   0.1241047348   0.123842718   0.2234835962
#> [1614,]  -0.4773944990  -0.637061904  -0.9488438874
#> [1615,]  -1.5007438025  -2.960830666  -3.5145339681
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#> [1618,]   0.4485400315   1.286134893   1.2730712884
#> [1619,]   0.0547063070   0.004975615   0.0709789073
#> [1620,]   0.1264092193  -0.219553888   0.0357865025
#> [1621,]  -1.9142417827  -3.622335899  -4.3972652240
#> [1622,]  -1.9564184607  -4.012321484  -4.6662843529
#> [1623,]   0.3377632602  -0.118490513   0.3554266224
#> [1624,]  -0.3848183940  -0.697998799  -0.8672207981
#> [1625,]  -0.5470091871  -1.017189764  -1.2466070309
#> [1626,]  -0.7982551359  -1.171237821  -1.6453958263
#> [1627,]  -1.1725886598  -1.503029758  -2.2963127295
#> [1628,]   1.3168317636   1.990066529   2.7464659546
#> [1629,]  -0.8620839260  -1.093306934  -1.6817406462
#> [1630,]   0.7170908509   1.493940274   1.7232719688
#> [1631,]   2.0222231465   2.545939079   3.9345606133
#> [1632,]   1.3663536992   3.133811667   3.4429494636
#> [1633,]   0.2626963578  -0.599022756  -0.0048555496
#> [1634,]   1.9486456987   4.620426350   4.9940646177
#> [1635,]  -0.2074352056  -0.535669690  -0.5559417211
#> [1636,]  -3.1262691739  -4.334627751  -6.3039308158
#> [1637,]   2.1426164233   4.357716655   5.0901492738
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#> [1640,]   1.3627291336   2.181958140   2.9101908485
#> [1641,]   0.9806099115   1.608411230   2.1154014505
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#> [1646,]   0.3733959448   1.272285125   1.1716821039
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#> [1661,]    2.7213295489    2.901878175    5.0038633340
#> [1662,]    0.7861113418    0.697757902    1.3674912312
#> [1663,]    1.2681617259    3.026559156    3.2609854221
#> [1664,]   -1.3271739127   -2.360933000   -2.9651777671
#> [1665,]    1.5489033839    1.821488756    2.9423009256
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#> [1671,]   -0.7700962065   -0.517098173   -1.2472620986
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#> [1675,]   -1.1184540957   -0.975320524   -1.9359515011
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#> [1770,]   0.7787421535   0.331043348   1.1547907803
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#> [1860,]  1.2496145800  3.093510052  3.2750124537
#> [1861,] -0.1458645127 -1.292130288 -0.8989682834
#> [1862,]  0.1147307968  0.391051237  0.3600840276
#> [1863,] -0.7346681308 -1.019472132 -1.4818805248
#> [1864,] -0.0270298820  1.959980181  1.0540012289
#> [1865,]  0.2313288789  0.355951060  0.4860003291
#> [1866,] -0.7272137000 -0.892745274 -1.4022569014
#> [1867,]  1.9825524522  2.384106799  3.7952819269
#> [1868,]  0.1768983035 -0.875238352 -0.2651320645
#> [1869,] -0.3232341218 -1.158296148 -1.0458722237
#> [1870,]  0.2002322108  0.417185837  0.4812061556
#> [1871,]  1.7660265543  3.373876423  4.0745592502
#> [1872,]  1.6916953995  3.050687567  3.8025135328
#> [1873,] -2.0877879612 -3.540911228 -4.5684864855
#> [1874,]  0.9256477002  0.374303600  1.3619866291
#> [1875,]  1.5681953245  2.784436237  3.5007531174
#> [1876,] -2.4927363019 -3.842080330 -5.2405850493
#> [1877,]  1.3969678267  1.042236774  2.3203881605
#> [1878,] -1.1623279214 -2.677152260 -2.9351066285
#> [1879,] -2.4386311587 -3.760600970 -5.1278994056
#> [1880,]  0.5752956194  1.763069902  1.6958118832
#> [1881,] -0.3605962277 -0.610305186 -0.7883499670
#> [1882,] -1.8189742665 -3.106927948 -3.9924387407
#> [1883,] -0.1377580416  0.142791951 -0.0925379139
#> [1884,]  0.0955972905  0.327698231  0.3010666694
#> [1885,] -1.0883536139 -1.152326610 -1.9966477815
```

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#> [1886,]   0.2223948830 -0.747005401 -0.1372348388
#> [1887,]   1.0332091874  1.974647648  2.3842375536
#> [1888,] -0.2138183554  0.814607982  0.1854461961
#> [1889,]   1.3250710561  2.361483311  2.9628609476
#> [1890,]   1.3075552435  2.157116024  2.8276037986
#> [1891,]   0.9716534078  2.021151110  2.3332862261
#> [1892,] -1.3931003469 -2.047091450 -2.8732177657
#> [1893,] -0.8500093939  0.307313450 -0.8893982792
#> [1894,]   1.1313795162  1.575410258  2.2850939147
#> [1895,] -1.2128970406 -3.237961161 -3.3093907489
#> [1896,] -0.6593355065 -1.146002636 -1.4581614111
#> [1897,] -0.0030576494  0.736758921  0.4050575279
#> [1898,] -0.2663732411  0.228588142 -0.2053051504
#> [1899,] -0.3596169675 -0.206520125 -0.5630450467
#> [1900,]   0.4558256436 -0.343718226  0.3776560559
#> [1901,]   0.5635263668  1.539924366  1.5572994352
#> [1902,] -0.4135918803 -1.110054381 -1.1317743450
#> [1903,] -1.8714935814 -3.049365187 -4.0259843325
#> [1904,]   0.8968534053  1.548798587  1.9778762745
#> [1905,] -0.2626211159 -0.523442507 -0.6179718507
#> [1906,] -1.1759144334 -1.649307756 -2.3816380656
#> [1907,] -2.1221723274 -3.115626847 -4.3753480632
#> [1908,]   0.5370231329  1.767502760  1.6505469238
#> [1909,] -0.0635088602 -0.189305684 -0.1842509821
#> [1910,] -0.7961776801 -1.874917331 -2.0333179479
#> [1911,]   0.7802647479  1.044656872  1.5527150523
#> [1912,]   1.6597171667  3.402989697  3.9581502607
#> [1913,] -0.1396916244 -1.683562817 -1.1084994826
#> [1914,] -0.7508845214 -0.603589461 -1.2713045629
#> [1915,]   2.4554553307  4.251615010  5.4213710397
#> [1916,]   1.7663803439  2.837620670  3.7774009280
#> [1917,] -0.1739070596 -0.958265982 -0.7486560555
#> [1918,] -0.0355279873 -0.021233466 -0.0560863601
#> [1919,] -0.4063852316 -2.211548557 -1.7340709513
#> [1920,] -0.0450586039 -0.301076565 -0.2232720482
#> [1921,]   0.0538770621 -0.129279905 -0.0045613368
#> [1922,] -1.3185568738 -2.358760420 -2.9532268047
#> [1923,] -0.0714675757 -0.581294237 -0.4117125730
#> [1924,] -1.0487332347 -0.674322299 -1.6819695969
#> [1925,]   1.5587902289  3.207268266  3.7236792279
#> [1926,]   1.0823880310  1.368970248  2.1094369700
#> [1927,]   1.7546847584  2.937414175  3.8181979881
#> [1928,]   1.8774488285  3.396512083  4.2260623974
#> [1929,] -0.6809581496 -0.965057127 -1.3847072240
#> [1930,]   0.4070144601  2.229895121  1.7450371613
```

```
#> [1931,] -1.8684590287 -1.554000491 -3.1923355087
#> [1932,]  0.2263605749 -0.398000132  0.0613936101
#> [1933,]  1.0277637869  2.247802886  2.5290369704
#> [1934,] -1.5795711788 -2.531420319 -3.3745253343
#> [1935,] -2.0795491305 -4.071070633 -4.8524291047
#> [1936,]  0.2561682469  1.659824346  1.2405695975
#> [1937,]  0.2787032746  1.076630703  0.9450222627
#> [1938,]  0.9161263572  1.888361569  2.1903524907
#> [1939,]  0.2270866720  0.008192944  0.2877191894
#> [1940,] -0.9451248470 -1.263166234 -1.8795557808
#> [1941,] -0.3468836898 -1.163390876 -1.0781901134
#> [1942,] -0.4130186398 -1.164196709 -1.1611062508
#> [1943,]  0.2616186516 -0.241355674  0.1922908287
#> [1944,]  0.3451681578  1.477153678  1.2501760986
#> [1945,] -0.4632127696 -1.146634209 -1.2139508548
#> [1946,]  0.1193647758 -0.740045594 -0.2618488797
#> [1947,]  0.2472092492 -0.286284148  0.1493891755
#> [1948,] -1.3200271398 -1.418947290 -2.4335032575
#> [1949,] -0.8259294330 -0.194577538 -1.1378995443
#> [1950,]  0.3645134925  0.488125343  0.7254300190
#> [1951,] -0.2545004326  0.446533907 -0.0695492256
#> [1952,]  0.4395072787  0.503905237  0.8277029211
#> [1953,]  0.2191094320  1.921692804  1.3396840417
#> [1954,] -0.6729812805 -0.342879998 -1.0294779740
#> [1955,] -0.5014356737 -1.145403448 -1.2609310159
#> [1956,] -0.8038698581 -2.510934293 -2.3958727222
#> [1957,] -1.9942914954 -3.626221736 -4.4992420599
#> [1958,] -0.1692497632 -0.159881261 -0.2997784086
#> [1959,] -0.5793280825 -1.872881329 -1.7617810265
#> [1960,]  0.8293215735  1.382094745  1.8011518052
#> [1961,]  0.0010757612  1.371188390  0.7622936001
#> [1962,]  0.5002694137 -0.239083798  0.4911442571
#> [1963,] -1.8651995876 -2.622168517 -3.7810595851
#> [1964,]  1.0832747474  2.361659444  2.6614436288
#> [1965,] -0.3710678988 -3.100045475 -2.1831095475
#> [1966,] -1.0457443814 -1.147477862 -1.9408240851
#> [1967,]  0.5308463006  0.868913212  1.1441649628
#> [1968,]  0.9381752389  1.307480611  1.8954823853
#> [1969,]  0.1438015734  0.684049148  0.5589362666
#> [1970,] -1.3501456620 -1.690318913 -2.6216603293
#> [1971,] -0.7410319107 -0.894278578 -1.4203388475
#> [1972,]  0.6428554910  1.043219398  1.3805707738
#> [1973,]  1.4534799391  2.288778332  3.0826359865
#> [1974,] -0.1529239732 -0.122196884 -0.2585072300
#> [1975,]  0.3265288075  1.509073940  1.2446476178
```

```
#> [1976,]   2.0405647157   4.561481607   5.0759738927
#> [1977,]  -1.1156521762  -1.865950249  -2.4267197732
#> [1978,]   2.0866232915   2.016250530   3.7209113130
#> [1979,]   1.5889858852   2.542583758   3.3924605223
#> [1980,]  -1.4020521102  -3.072217483  -3.4532824603
#> [1981,]  -0.1250993239  -0.538379004  -0.4547741116
#> [1982,]  -1.6787983821  -2.757314000  -3.6236211682
#> [1983,]  -1.3957252356  -3.311568730  -3.5782228979
#> [1984,]   1.1626135511   3.470130515   3.3755325341
#> [1985,]   1.6474625821   2.330505438   3.3476851825
#> [1986,]  -2.1434646682  -3.197777871  -4.4474895567
#> [1987,]   1.4656234947   1.685171447   2.7628022033
#> [1988,]  -0.1076983586  -1.219121289  -0.8108589302
#> [1989,]   0.5557444417   1.652067679   1.6098303766
#> [1990,]   0.6325070758   1.552771685   1.6504466964
#> [1991,]  -0.5801769310  -2.427466235  -2.0706109272
#> [1992,]  -0.8744505344  -1.611612783  -1.9847996005
#> [1993,]   1.6168624138   1.775780673   3.0016783773
#> [1994,]  -1.2480287512  -2.381584736  -2.8779462143
#> [1995,]   0.0520290750  -0.222170216  -0.0584159727
#> [1996,]   1.0887183503   1.744294518   2.3256200048
#> [1997,]  -1.5442437869  -2.229861757  -3.1631204211
#> [1998,]   0.4194792014   0.561108895   0.8344739525
#> [1999,]   0.0788029180   0.453733050   0.3500684773
#> [2000,]   0.9901645005   1.150094630   1.8729693039
#>
#> [[1]][[16]]$value[[1]]$decomposition
#> [1] "eigen"
#>
#>
#>
#> [[1]][[16]]$visible
#> [1] TRUE
```

Environment

```r
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/