

# include.r

denis

2021-07-11

```
#!/usr/bin/r

if (require("tidyr", quietly = TRUE)) {
  fruits <- c(
    type   = c("apple", "orange", "apple", "orange", "orange", "orange"),
    year   = c(2010, 2010, 2012, 2010, 2010, 2012),
    size   = c("XS", "S", "M", "S", "S", "M"),
    weights = rnorm(6)
  )

  # All possible combinations -----
  fruits
}
```

```
##           type1           type2           type3
##         "apple"         "orange"         "apple"
##           type4           type5           type6
##         "orange"         "orange"         "orange"
##           year1           year2           year3
##         "2010"          "2010"          "2012"
##           year4           year5           year6
##         "2010"          "2010"          "2012"
##           size1           size2           size3
##          "XS"            "S"             "M"
##           size4           size5           size6
##           "S"            "S"             "M"
##       weights1       weights2       weights3
## "-0.484246458438667" "0.885297821434961" "1.83796325108687"
##       weights4       weights5       weights6
## "-1.23007336848346" "1.35384785355033" "-0.351135312093144"
```

```
# Note that 'from' and 'to' contain valid but empty intervals.
```

```
to <- c(
  matrix(
    c(
      2, 6,
      2, 8,
      2, 9,
      4, 4,
      6, 8
```

```

    ),
    ncol = 2, byrow = TRUE
  ),
  closed = c( TRUE, FALSE ),
  type = "Z"
)

from <- c(
  matrix(
    c(
      2, 8,
      8, 9,
      6, 9,
      11, 12,
      3, 3
    ),
    ncol = 2, byrow = TRUE
  ),
  closed = c( TRUE, FALSE ),
  type = "Z"
)
rownames <- letters

rownames

```

```

## [1] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j" "k" "l" "m" "n" "o" "p" "q" "r" "s"
## [20] "t" "u" "v" "w" "x" "y" "z"

```

```
to
```

```

##
##      "2"      "2"      "2"      "4"      "6"      "6"      "8"      "9"      "4"      "8"
## closed1 closed2  type
##  "TRUE" "FALSE"  "Z"

```

```

closed <- TRUE
to

```

```

##
##      "2"      "2"      "2"      "4"      "6"      "6"      "8"      "9"      "4"      "8"
## closed1 closed2  type
##  "TRUE" "FALSE"  "Z"

```

```
# Intervals_full
```

```

F <- FALSE
T <- TRUE

to <- c(
  rep( c(2,8), c(4,4) ),
  closed = matrix( c(F,F,T,T,F,T,F,T), ncol = 2 ),
  type = "R"
)

```

```

)

type <- "R"
from <- c( from, "Intervals_full" )

from

##
##          "2"          "8"          "6"          "11"
##
##          "3"          "8"          "9"          "9"
##          closed1      closed2
##          "12"         "3"         "TRUE"        "FALSE"
##          type
##          "Z" "Intervals_full"

to

##
##          "2"          "2"          "2"          "2"          "8"          "8"          "8"          closed1 closed2
## closed3 closed4 closed5 closed6 closed7 closed8      type      "8" "FALSE" "FALSE"
## "TRUE" "TRUE" "FALSE" "TRUE" "FALSE" "TRUE"      "R"

c(from, to)

##
##          "2"          "8"          "6"          "11"
##
##          "3"          "8"          "9"          "9"
##          closed1      closed2
##          "12"         "3"         "TRUE"        "FALSE"
##          type
##          "Z" "Intervals_full"          "2"          "2"
##
##          "2"          "2"          "8"          "8"
##          closed1      closed2
##          "8"          "8"          "FALSE"        "FALSE"
##          closed3      closed4      closed5      closed6
##          "TRUE"        "TRUE"        "FALSE"        "TRUE"
##          closed7      closed8          type
##          "FALSE"        "TRUE"          "R"

# Testing

B <- 1000

x1 <- rexp( B, 1/1000 )
s1 <- runif( B, max=5 )
x2 <- rexp( B, 1/1000 )
s2 <- runif( B, max=3 )

from <- c( cbind( x1, x1 + s1 ) )

```

```

to <- c( cbind( x2, x2 + s2 ) )

ii <- c( from, to )
ii_match <- which( sapply( ii, length ) > 0 )

from

```

```

##      [1] 267.299668 312.363647 1401.577446 338.218500 151.980289 1350.883705
##      [7] 2106.555248 213.047367 1680.637283 149.269322 809.478221 1100.605487
##     [13] 493.309352 649.838804 883.659921 134.150454 370.711802 292.462807
##     [19] 572.981517 3617.410457 883.116567 2411.309863 879.088034 3925.747534
##     [25] 2841.695883 254.058248 547.443481 481.334092 390.370307 898.762343
##     [31] 654.955130 2026.820389 905.470174 679.771040 622.342547 142.511932
##     [37] 940.934222 713.503670 592.887283 176.225953 706.568941 2422.014294
##     [43] 1202.739786 415.247831 668.483504 205.038799 506.402539 1657.708764
##     [49] 1397.391239 669.867033 1903.306806 588.045450 1134.960341 1025.876670
##     [55] 619.140834 1613.219824 149.908257 58.044814 1329.336949 2493.809698
##     [61] 6801.661236 107.558883 516.620128 374.618568 60.881155 178.579060
##     [67] 834.549988 1464.893576 1253.535370 709.285226 614.928531 735.851543
##     [73] 1868.505750 78.606945 426.099902 2630.593551 161.378477 1088.510856
##     [79] 355.076490 2575.825846 25.955713 2395.934060 61.796310 592.255456
##     [85] 3689.745386 1105.134494 648.952232 91.495153 1032.756575 744.917724
##     [91] 0.828334 823.190582 638.017997 592.308518 230.378108 733.830797
##     [97] 74.381588 323.275864 1109.498327 342.864480 1610.864401 272.731314
##    [103] 963.060248 656.275595 577.720773 630.531139 541.349420 532.044438
##    [109] 333.992130 1083.176540 1381.111458 1963.903377 295.824422 971.998083
##    [115] 1075.959879 129.210219 615.845691 486.170992 20.277525 1531.121979
##    [121] 1163.696648 1924.432651 2089.664099 1.224372 1495.163668 1741.777578
##    [127] 874.964963 2147.608990 883.196881 2768.637819 2362.533875 1605.457463
##    [133] 34.008487 545.726251 361.407093 242.918523 1303.338435 2637.833865
##    [139] 106.479801 997.879150 71.080904 94.177562 720.927495 3430.110156
##    [145] 136.052592 698.290310 819.224201 177.628016 1276.576712 806.642009
##    [151] 228.840303 418.041582 526.158622 95.754395 1231.295194 2809.726395
##    [157] 3573.778146 957.441102 351.868053 2248.388069 1876.590418 1858.639147
##    [163] 2068.063613 45.103335 2204.816491 3515.660872 952.230279 415.384222
##    [169] 55.745161 656.609819 647.457663 105.458538 73.190168 1029.039911
##    [175] 472.500528 1997.004688 73.547849 2381.244028 289.506710 2415.586715
##    [181] 486.030416 230.362287 1119.229794 60.705232 388.833173 1274.831588
##    [187] 2868.902258 1128.412624 476.258545 820.813249 605.484156 594.319941
##    [193] 928.409907 6007.565872 349.686559 982.756912 164.080462 7016.557198
##    [199] 1198.852277 82.523856 185.156067 710.528186 766.298351 1398.306073
##    [205] 2653.989935 608.935338 1046.818647 2092.556933 675.527358 287.864299
##    [211] 545.929726 3262.135640 2739.681484 493.199904 4484.985263 604.797092
##    [217] 1027.232786 1704.005085 509.128887 310.614086 166.768049 1395.031014
##    [223] 507.079388 2872.114330 1251.295446 3414.435245 2017.240442 83.492948
##    [229] 481.046500 1162.836245 1291.075618 176.078566 989.615452 192.260346
##    [235] 604.172852 306.218281 129.060071 663.741240 1237.799886 846.489075
##    [241] 326.704230 1610.759892 225.999235 2702.739203 40.499466 1067.595790
##    [247] 451.831767 2.672798 373.813626 1235.394485 2185.332410 442.544113
##    [253] 561.829200 882.615223 102.920806 525.963749 398.700110 183.141089
##    [259] 1758.844772 1425.095393 1027.378633 1322.603616 1236.912673 477.338367
##    [265] 119.328016 911.311409 123.872300 17.296199 490.675019 89.295728
##    [271] 556.758826 2530.688004 488.799561 679.983067 173.876388 2911.924966

```

##	[277]	838.625933	112.199480	508.461424	546.540738	353.864859	3962.281342
##	[283]	3132.246107	1953.890424	1136.417588	988.926066	218.141790	766.167542
##	[289]	1265.065111	1456.543542	379.873577	2344.572408	2832.026828	2949.199918
##	[295]	1605.794461	893.432669	454.812959	96.601819	1393.929607	211.334613
##	[301]	1228.746114	1028.649659	1172.457813	1018.755028	476.083789	193.000271
##	[307]	95.129495	1863.833437	2340.649499	2920.468271	5.111893	242.211369
##	[313]	1207.982476	834.682723	309.315907	1176.772160	9.000396	181.029195
##	[319]	411.162352	668.713107	9392.409777	763.171060	873.810302	2855.572551
##	[325]	2047.076307	969.303352	1023.655547	511.793319	3483.855838	2198.595686
##	[331]	1430.946374	117.921690	246.218576	5193.758713	975.316304	1580.213958
##	[337]	1537.418798	1593.557153	211.566035	1507.958874	304.559476	526.286791
##	[343]	417.244198	557.960180	980.365445	1444.457564	770.084343	3017.224006
##	[349]	143.055973	856.053449	808.403708	184.846701	371.883375	1045.659454
##	[355]	2329.589179	508.105192	245.437735	476.745565	55.324781	2996.706693
##	[361]	675.862209	123.985177	357.499108	188.959962	672.612046	21.315018
##	[367]	87.718888	900.078758	440.429709	1517.392872	818.233554	1289.397802
##	[373]	1209.298300	137.161069	1499.929954	365.842831	2429.595158	77.702429
##	[379]	2197.996313	245.183840	744.493397	168.897704	1140.856277	460.298483
##	[385]	1554.749731	1435.107835	497.702894	95.523141	1031.216196	2510.322949
##	[391]	1811.584227	804.381635	1337.008841	1621.464980	905.062855	399.939653
##	[397]	2599.297171	1372.652588	2580.274323	762.397576	74.617456	604.690645
##	[403]	798.969840	3.328209	2283.458769	1028.381585	545.652812	58.460866
##	[409]	801.930513	847.923140	2273.964988	322.512083	76.734268	16.348482
##	[415]	1935.265968	226.893717	517.865472	323.515498	265.948027	109.274061
##	[421]	1206.316257	4172.630030	692.773564	1235.816211	568.129436	532.447650
##	[427]	1560.718726	322.954436	108.097614	2446.364660	203.923147	346.091778
##	[433]	1026.631565	867.968133	276.381095	444.076469	1460.830413	897.525919
##	[439]	412.202119	486.289470	152.400819	2356.391182	29.159464	10.887275
##	[445]	764.689750	38.522694	282.249032	452.839901	605.415389	197.714793
##	[451]	60.810594	1460.092544	76.436610	1244.827501	755.044430	82.782038
##	[457]	996.057466	522.009165	920.784949	932.611296	2510.082932	865.209460
##	[463]	44.040485	107.963711	1154.823439	123.763377	1811.976954	105.989511
##	[469]	1435.128855	79.678753	1431.244446	220.330966	2704.008767	3469.494830
##	[475]	2321.881315	958.888960	409.234428	1163.110155	30.492088	770.553755
##	[481]	848.923944	955.390784	910.559613	886.728685	416.511333	482.028703
##	[487]	3631.618174	1047.456259	504.683790	269.634952	100.248958	375.094763
##	[493]	1012.879502	680.175108	456.962465	493.297108	1060.708657	543.952454
##	[499]	2543.748990	1788.332022	771.918217	1338.454244	96.667710	342.376660
##	[505]	916.567930	15.034067	237.313074	2131.040154	11.894382	35.224942
##	[511]	389.766200	359.792871	86.178242	4536.210973	1435.445400	396.394374
##	[517]	1521.577520	501.949557	810.662408	1080.328040	1927.517684	727.583196
##	[523]	166.228371	91.968920	61.898794	3298.697226	13.820218	114.923015
##	[529]	777.568832	1185.582536	1671.069398	2731.071284	1591.453906	305.703309
##	[535]	455.106661	650.411072	329.157754	1653.681658	5961.972579	387.795455
##	[541]	470.650848	401.900020	984.882965	89.144696	272.891113	672.405082
##	[547]	1312.658728	2013.176246	1176.325575	722.759305	897.483725	1196.919895
##	[553]	371.354930	78.138745	1327.337839	1808.850910	1107.220660	174.225439
##	[559]	759.853627	1201.787548	2118.878340	1126.799803	217.250717	100.416027
##	[565]	235.619323	197.990226	964.519931	5428.457128	1382.258615	24.985289
##	[571]	312.417795	856.017584	158.654270	904.785070	264.749819	786.250514
##	[577]	296.120284	14.680112	349.553857	2107.294714	59.310009	1685.349568
##	[583]	2541.794630	807.810287	1513.860250	304.416024	1249.645451	2062.357768
##	[589]	1239.144453	77.105506	522.224332	271.041305	1206.227271	83.998975
##	[595]	452.443207	961.859101	222.598216	2.538880	754.395207	195.897149

##	[601]	100.261110	358.420683	473.092452	34.454946	1266.612206	280.521272
##	[607]	46.427341	619.027488	371.428930	602.454848	1655.687625	3004.165992
##	[613]	3455.316633	604.435851	390.447329	57.059221	157.574113	1324.270887
##	[619]	347.420609	1444.556476	1740.140922	437.585327	204.136023	270.976673
##	[625]	430.827395	486.176592	283.057749	1753.605779	530.529138	2617.249315
##	[631]	2.331116	116.763398	1313.309707	80.730601	2444.522371	221.164457
##	[637]	129.918106	585.080673	105.024721	648.362797	547.414097	8413.890816
##	[643]	286.894349	2310.434272	3026.334360	534.204014	384.841876	1361.730242
##	[649]	4878.166245	1980.741626	1079.857985	1270.673986	404.227535	307.420455
##	[655]	716.439109	1897.662831	64.890737	1049.466776	938.176812	1755.157761
##	[661]	1581.531851	2052.456779	546.500122	260.427454	37.075541	2611.632233
##	[667]	159.818125	1609.972391	1214.165769	254.280922	85.900509	833.286088
##	[673]	2612.432951	57.626333	311.940248	358.786570	106.454878	251.753917
##	[679]	220.714996	373.953089	1112.687346	1553.030947	255.102608	364.375749
##	[685]	2620.598120	688.347238	260.390015	646.325214	505.399886	857.951061
##	[691]	211.858519	3092.848773	698.914862	564.741145	506.366813	153.879000
##	[697]	81.660264	743.015919	244.980572	436.491244	746.974514	382.306763
##	[703]	1479.824452	361.793798	160.235481	112.655010	1160.731575	1424.298359
##	[709]	553.938219	67.720299	1547.245733	258.269227	1288.727234	626.747163
##	[715]	117.189743	784.813123	1051.869290	460.294280	5.894439	800.802763
##	[721]	1239.122953	1228.265986	362.272470	69.302026	698.178482	733.986997
##	[727]	420.668260	187.534493	619.663341	2440.614959	2438.852066	1229.849839
##	[733]	683.131260	5241.132008	1346.297720	3517.624781	481.924685	46.150810
##	[739]	913.942165	1595.724011	291.877326	116.677547	239.336301	282.498893
##	[745]	1466.904281	747.918164	51.034778	264.718634	1609.331074	364.642870
##	[751]	302.776458	32.715103	1660.807123	1110.341605	2667.461024	64.504934
##	[757]	33.978451	330.795378	242.797253	464.983432	332.594615	144.650077
##	[763]	17.604121	995.738294	1098.042221	256.862719	2315.892944	1162.370499
##	[769]	207.930771	970.025059	654.062967	1158.161035	1077.382278	902.285155
##	[775]	2949.132837	349.353902	263.228601	2273.953175	22.888932	397.259104
##	[781]	333.552409	268.411788	237.101588	529.669369	110.647065	489.177741
##	[787]	438.137632	754.755972	179.113252	2014.064630	107.851119	147.933302
##	[793]	1089.130701	156.181460	1558.357902	205.398772	2999.914974	1996.861363
##	[799]	587.461789	1041.118232	387.912360	392.939775	166.161002	844.745097
##	[805]	390.585473	188.814387	458.063327	1411.714815	713.049082	524.485965
##	[811]	1380.619309	1183.937262	3450.042821	1070.003582	150.143201	460.609909
##	[817]	2798.407674	1901.813291	3667.752286	1166.062240	344.432477	3489.004230
##	[823]	295.668824	2582.699720	341.824173	102.547619	1805.060245	597.766601
##	[829]	697.098361	14.372711	879.342394	1770.715108	1015.957763	776.161866
##	[835]	801.810858	2226.214060	1382.721104	752.129751	4193.777208	10.519809
##	[841]	422.646039	112.394001	545.421774	629.023618	1214.548402	292.694176
##	[847]	130.751910	798.255480	2204.501076	989.627422	561.773252	1108.046449
##	[853]	2906.818554	238.995561	1727.508120	121.745020	1541.944607	6441.560251
##	[859]	192.278835	2547.108607	2525.999240	161.709848	737.119715	856.025621
##	[865]	780.790249	299.751726	128.870322	484.734239	1634.935066	384.796868
##	[871]	1884.824030	464.694890	41.216817	2157.144790	255.537539	529.772195
##	[877]	716.958756	6466.901816	969.626536	311.213180	288.548182	1768.531745
##	[883]	408.299145	77.028898	73.930061	3309.472710	4696.395118	871.658340
##	[889]	2511.824759	794.904987	1281.959587	710.129990	558.709050	715.862644
##	[895]	1244.391321	790.106961	175.348108	1036.233539	1018.770131	551.508695
##	[901]	213.410678	116.536897	489.837644	48.706467	3633.523012	1693.691602
##	[907]	1719.181945	1859.737884	505.109882	271.355258	358.533065	82.774528
##	[913]	1507.583847	174.448137	1476.391377	27.702533	1454.499869	242.359598
##	[919]	461.639486	424.387471	1232.853753	641.010173	44.199388	421.322482

##	[925]	617.166914	371.437554	741.033567	199.693834	623.386647	347.175859
##	[931]	1443.161923	1155.534145	2677.323269	487.109550	2673.197145	641.782109
##	[937]	182.931710	735.848491	172.719579	120.859483	435.906775	789.040774
##	[943]	507.388202	878.957972	3240.853444	2576.669017	499.244688	728.231805
##	[949]	2204.545559	3276.925117	61.138478	880.287054	166.568599	1032.363711
##	[955]	184.150150	266.760144	1796.894623	1507.553352	3192.109600	389.968032
##	[961]	868.444785	319.714306	1197.532685	3817.097073	357.733488	492.647478
##	[967]	207.794678	1832.746657	669.560408	696.367964	1755.022934	223.716154
##	[973]	789.923778	6493.040360	205.272014	658.530465	453.262235	1831.409391
##	[979]	595.608724	1872.468328	25.223685	211.824874	1002.542686	217.617559
##	[985]	717.235761	237.516417	587.922324	3204.176955	383.066828	1300.919650
##	[991]	1930.936037	1224.843016	227.246286	767.535870	3301.576704	238.795014
##	[997]	371.484458	1150.588592	247.947022	311.638620	271.593661	313.590535
##	[1003]	1403.275295	342.169899	155.390421	1351.602650	2107.564543	217.298741
##	[1009]	1682.462790	151.774142	810.312570	1101.935928	498.078381	650.994697
##	[1015]	885.130769	135.140964	374.856779	294.612805	576.580222	3622.339867
##	[1021]	883.972874	2415.815931	879.867104	3927.155112	2845.770191	255.232678
##	[1027]	548.201710	482.873133	394.660405	899.186094	655.415399	2031.423245
##	[1033]	908.926761	683.407998	626.332123	146.199837	942.454459	717.695356
##	[1039]	595.002712	178.582483	708.855814	2426.573402	1207.280273	417.999445
##	[1045]	670.705996	205.212989	506.848697	1660.279660	1402.343593	674.565299
##	[1051]	1903.496738	588.232020	1135.847470	1029.965689	619.530840	1613.659982
##	[1057]	151.912307	59.046721	1332.415019	2495.215237	6805.946169	111.984408
##	[1063]	520.974533	375.094699	64.757352	181.419003	835.858678	1467.583772
##	[1069]	1256.628361	710.375865	619.507081	736.813178	1870.170421	79.551176
##	[1075]	430.633199	2634.671678	166.291386	1089.227462	355.868663	2579.982131
##	[1081]	27.488423	2397.203547	62.471104	595.075960	3693.566957	1107.186252
##	[1087]	651.491224	95.266331	1037.241562	746.218467	3.700349	824.000661
##	[1093]	642.271127	595.963079	233.061701	737.371886	74.407448	325.255767
##	[1099]	1112.601255	347.555089	1615.168682	276.956098	964.952873	657.620436
##	[1105]	578.116154	634.263185	543.625916	536.837029	336.594396	1083.362018
##	[1111]	1383.785842	1967.576406	299.702354	974.058352	1076.213178	133.165406
##	[1117]	616.548825	489.227242	22.388671	1532.341077	1164.264687	1925.336586
##	[1123]	2090.498135	1.856258	1497.602660	1745.450966	879.315284	2149.282099
##	[1129]	886.266366	2772.001554	2366.831761	1607.358859	35.907125	549.911942
##	[1135]	363.585226	246.400888	1303.807001	2638.068726	109.214883	999.480709
##	[1141]	73.056717	94.792765	722.625165	3432.353706	138.609814	701.706274
##	[1147]	824.087045	179.118231	1281.541586	810.997739	231.634119	420.968764
##	[1153]	527.654763	96.817845	1231.879672	2810.257069	3578.591889	960.708920
##	[1159]	355.768157	2248.605134	1879.382638	1863.023909	2070.838389	47.983654
##	[1165]	2205.583084	3516.499843	952.596020	417.292269	57.860820	660.888921
##	[1171]	648.067042	107.483994	73.207204	1031.474836	477.220273	2000.239752
##	[1177]	73.747038	2381.531979	291.838316	2416.140152	487.841281	231.016250
##	[1183]	1122.693569	63.511294	389.166447	1278.631733	2869.124588	1132.967090
##	[1189]	480.935514	822.547496	606.127505	594.999223	928.563939	6008.898079
##	[1195]	350.985507	985.802635	167.810941	7019.629305	1202.706241	84.680877
##	[1201]	186.017743	710.624569	768.053702	1401.280614	2657.656184	612.215951
##	[1207]	1051.261040	2095.596293	678.826037	288.528441	546.467074	3266.150580
##	[1213]	2743.795917	496.379645	4486.377388	604.836244	1027.792010	1707.703486
##	[1219]	509.779599	314.144790	170.332368	1399.264226	509.025522	2876.427898
##	[1225]	1251.377022	3419.232187	2020.000530	87.675724	485.657804	1165.311025
##	[1231]	1293.915713	177.571627	992.385011	193.816970	605.492719	308.996313
##	[1237]	130.355244	667.208503	1240.516368	849.186973	328.825498	1612.319471
##	[1243]	229.896537	2706.572496	42.948014	1071.991489	452.572399	7.027481

##	[1249]	378.293755	1237.422968	2188.393636	444.210808	564.710154	887.400260
##	[1255]	103.737827	528.407283	402.336481	187.540917	1760.341020	1428.222305
##	[1261]	1030.326219	1325.334733	1240.292083	479.263744	121.204176	915.116004
##	[1267]	126.480247	17.938005	490.875111	92.268672	558.429091	2533.264840
##	[1273]	489.357699	680.529986	177.986937	2913.572980	841.348481	113.463950
##	[1279]	510.848895	549.256799	357.904545	3966.589013	3134.549008	1954.356284
##	[1285]	1136.969069	992.507864	220.413252	766.508882	1269.389142	1460.284123
##	[1291]	383.769202	2348.750177	2832.921844	2952.191844	1609.188078	893.930025
##	[1297]	458.819232	98.357477	1395.144013	215.909700	1230.491537	1031.630181
##	[1303]	1175.589917	1018.947045	479.429924	193.453786	99.501745	1863.873166
##	[1309]	2343.103985	2922.402530	9.602270	245.717330	1210.255693	837.913060
##	[1315]	312.636305	1180.665259	12.213786	181.135608	415.850593	669.310228
##	[1321]	9393.018004	765.742416	876.716782	2856.090025	2050.369713	970.335497
##	[1327]	1024.093086	515.908420	3486.382654	2200.404400	1431.786978	121.174852
##	[1333]	249.305657	5194.420850	978.212786	1585.207001	1540.864333	1593.565779
##	[1339]	211.845473	1512.925434	308.538605	527.548567	418.759289	560.174498
##	[1345]	982.630179	1447.548643	771.801348	3017.827160	144.901259	857.951959
##	[1351]	809.237129	186.377780	373.087341	1049.694016	2331.361384	508.243094
##	[1357]	248.962213	481.023613	57.410944	2998.403363	677.287510	126.539294
##	[1363]	357.789619	193.001052	674.932797	23.496847	90.661964	901.404683
##	[1369]	441.847436	1519.547845	822.959514	1290.845318	1212.961592	137.223823
##	[1375]	1504.645987	367.348275	2434.454870	77.902648	2199.247388	246.274855
##	[1381]	746.278746	172.547534	1143.908351	465.117749	1557.107131	1436.468002
##	[1387]	499.647325	99.551290	1035.257639	2515.225138	1815.290419	807.740063
##	[1393]	1340.524511	1626.338123	907.479074	400.962450	2599.548980	1374.665522
##	[1399]	2583.601328	764.086044	79.391409	609.526902	801.255226	6.104576
##	[1405]	2284.147648	1029.023069	547.774554	61.147497	802.038047	848.349338
##	[1411]	2276.462614	324.690321	79.383024	17.222183	1938.596339	228.374361
##	[1417]	520.741365	325.452047	269.079234	109.796472	1209.652206	4175.704075
##	[1423]	693.380509	1239.651618	568.982977	537.010429	1564.874414	324.325322
##	[1429]	110.222796	2450.879599	208.096511	348.796256	1027.906883	869.716235
##	[1435]	279.600894	448.078646	1463.570003	900.120585	415.779425	490.232034
##	[1441]	156.597460	2358.267573	34.087645	15.021528	764.883109	38.622695
##	[1447]	284.224695	456.406900	609.807085	199.004982	61.563743	1461.270128
##	[1453]	78.277507	1248.488148	756.149727	85.618557	1000.533298	524.101341
##	[1459]	922.069026	935.129837	2512.895764	869.824686	44.300086	111.541048
##	[1465]	1158.572001	128.193584	1814.660893	109.801552	1437.621682	81.232727
##	[1471]	1432.539101	221.666845	2707.977557	3470.414095	2322.400357	963.817386
##	[1477]	411.477910	1167.533528	34.340036	774.192203	853.495949	956.746094
##	[1483]	912.475090	890.615309	416.534886	482.606350	3632.404093	1049.745629
##	[1489]	506.719896	271.574527	100.590695	377.036467	1014.084223	683.155631
##	[1495]	459.433614	494.531869	1064.221933	547.591308	2546.854759	1791.372749
##	[1501]	772.875752	1341.709732	97.171323	342.658527	917.038881	16.594587
##	[1507]	240.001328	2135.305800	15.932560	37.304942	391.258513	363.270795
##	[1513]	89.197755	4540.940212	1438.272937	400.352353	1524.298431	505.938597
##	[1519]	815.607798	1084.902669	1927.970433	727.842002	169.453057	95.104398
##	[1525]	66.893671	3300.140593	18.076833	119.111281	782.175641	1186.662313
##	[1531]	1674.367223	2735.235817	1593.327274	307.978777	458.136635	653.624118
##	[1537]	329.392999	1654.057951	5965.144763	392.778121	474.027165	404.169379
##	[1543]	988.297150	91.270230	273.240073	672.957700	1314.926666	2017.850370
##	[1549]	1180.415533	722.792706	897.931172	1200.832743	372.567856	78.416741
##	[1555]	1328.191189	1810.695551	1108.636370	175.022527	760.940362	1201.826174
##	[1561]	2123.317109	1127.495458	220.558024	103.431484	237.087916	200.612867
##	[1567]	965.781427	5433.346730	1383.691833	26.995772	314.592413	856.493032



##	[1573]	160.972171	905.995379	266.646464	787.192128	298.467464	16.428339
##	[1579]	353.188302	2110.549681	62.986697	1688.902882	2546.317099	812.542510
##	[1585]	1516.283861	306.621408	1250.439055	2066.384076	1242.435137	79.585810
##	[1591]	523.407877	272.003979	1207.776148	85.535414	457.171043	963.538725
##	[1597]	225.647230	6.865397	756.981365	195.919463	103.090655	362.296291
##	[1603]	477.851842	35.143413	1270.203158	283.758991	47.611009	619.626868
##	[1609]	374.159567	604.451750	1657.353126	3008.605948	3455.885598	609.125693
##	[1615]	391.932305	60.676456	158.106595	1324.309377	349.797602	1447.364759
##	[1621]	1742.716753	440.860057	208.979250	275.889672	431.034054	489.407591
##	[1627]	285.923707	1753.744478	534.568881	2621.525507	2.571441	119.344411
##	[1633]	1314.241645	82.716324	2446.208110	224.733340	131.306391	587.421893
##	[1639]	109.622255	649.024370	550.189463	8415.007998	290.454247	2312.963047
##	[1645]	3027.636163	534.719810	386.005346	1364.505857	4878.198842	1982.580598
##	[1651]	1079.998091	1270.966209	405.506575	310.061454	719.393536	1898.921251
##	[1657]	69.443776	1054.059335	941.881366	1757.253616	1584.764007	2056.344724
##	[1663]	551.325312	262.678127	39.554472	2615.515617	163.207286	1612.898741
##	[1669]	1217.515157	256.133730	88.596648	834.904480	2613.699345	58.805479
##	[1675]	316.667250	360.836745	109.520520	256.518649	221.033999	375.216897
##	[1681]	1115.310502	1554.704286	257.625409	365.142838	2625.426556	688.899144
##	[1687]	260.792882	651.066912	508.362048	862.366691	214.846328	3094.799924
##	[1693]	699.703247	567.043786	506.792843	157.954813	84.481198	747.301033
##	[1699]	249.928066	438.874944	747.750281	386.647012	1480.026133	365.736064
##	[1705]	161.553317	113.297655	1162.589256	1426.898231	556.328165	70.500778
##	[1711]	1548.580603	258.767973	1293.612748	629.217073	120.637603	788.056511
##	[1717]	1052.874572	462.450461	9.270184	801.850955	1240.480359	1231.797871
##	[1723]	364.133663	73.301395	702.789642	734.154770	421.390983	189.420228
##	[1729]	623.076632	2441.270510	2442.033291	1230.468571	685.788292	5241.969396
##	[1735]	1348.972512	3521.881531	485.967920	50.204883	917.540113	1600.424945
##	[1741]	295.334956	120.768804	241.842211	286.200243	1467.441893	750.060410
##	[1747]	53.813121	267.870374	1612.553749	369.189007	304.564344	35.552288
##	[1753]	1663.959813	1114.790223	2668.539758	64.668711	37.869229	334.673865
##	[1759]	244.547893	469.246757	332.803272	145.804457	22.046806	996.109215
##	[1765]	1099.268507	258.039578	2316.937435	1165.421682	210.449757	973.079591
##	[1771]	658.212222	1158.437935	1078.703552	906.318521	2952.921273	352.301190
##	[1777]	266.285396	2274.465531	26.384295	397.822566	337.417908	272.888216
##	[1783]	239.804923	530.911086	114.411785	490.360902	438.723455	757.435672
##	[1789]	183.668915	2018.411747	111.335401	152.261401	1092.872194	159.383928
##	[1795]	1563.260559	209.302040	2999.987751	2000.689243	588.523645	1042.038600
##	[1801]	388.622808	396.682273	167.333821	847.994582	393.395723	192.641146
##	[1807]	458.078588	1415.278560	717.483997	526.101833	1385.109846	1185.371561
##	[1813]	3452.937636	1070.114720	151.947748	461.382791	2798.642785	1905.064549
##	[1819]	3670.185197	1166.213553	349.089074	3491.108504	297.408160	2585.062348
##	[1825]	345.460457	107.174637	1807.839116	598.250786	701.917121	15.215542
##	[1831]	881.821815	1771.213242	1018.690050	777.169718	804.290936	2230.752474
##	[1837]	1383.308588	757.072631	4193.919855	11.456451	426.902381	114.792464
##	[1843]	545.860499	629.637155	1219.333386	294.416708	132.699868	801.615138
##	[1849]	2205.342477	993.058677	564.658819	1108.882876	2908.495910	239.734283
##	[1855]	1728.946633	123.961227	1546.451957	6442.650541	196.195333	2548.863676
##	[1861]	2530.218794	166.553678	741.982914	858.971423	781.911960	304.560988
##	[1867]	132.905896	489.273197	1635.470384	385.227224	1886.295872	467.635547
##	[1873]	44.724723	2160.227795	255.790080	531.273519	717.673312	6467.537377
##	[1879]	973.812798	315.402508	292.559221	1772.407887	411.895545	77.493274
##	[1885]	74.681457	3311.719537	4701.063022	873.531814	2515.980163	798.295524
##	[1891]	1282.694724	714.177608	559.580847	719.217430	1247.021761	792.641730

```
## [1897] 178.020644 1040.500916 1019.616176 555.370102 217.067200 117.286041
## [1903] 490.986248 50.194840 3634.508143 1696.384635 1723.244359 1861.800409
## [1909] 507.350183 275.579486 363.464770 83.121284 1510.787084 175.060047
## [1915] 1476.408631 29.490790 1458.235104 246.241514 466.436272 426.649882
## [1921] 1236.441518 643.095050 46.814814 422.624527 617.809586 374.048833
## [1927] 744.709209 203.759525 624.394476 350.509690 1446.936394 1156.723421
## [1933] 2678.474162 489.643326 2676.031407 646.699268 186.905832 738.342545
## [1939] 176.499071 125.432811 436.680890 789.879419 509.098376 879.812722
## [1945] 3242.800269 2578.136016 499.835886 732.216137 2208.916601 3280.914753
## [1951] 64.906210 883.095299 167.336241 1036.424948 188.949406 270.510651
## [1957] 1798.630183 1511.643649 3194.230510 392.676773 872.812548 323.516473
## [1963] 1202.260657 3821.326444 360.464616 497.220630 210.243263 1835.672294
## [1969] 671.913897 697.559854 1759.241436 228.515989 789.924997 6497.632452
## [1975] 206.447096 662.354400 457.337400 1833.352734 596.022346 1873.289322
## [1981] 30.020494 214.765235 1004.487711 219.953552 720.955356 239.409558
## [1987] 589.922098 3204.181744 385.176702 1303.591765 1935.357854 1228.239919
## [1993] 231.300941 770.732368 3305.766842 239.989774 372.820832 1153.428267
## [1999] 249.629189 313.429989
```

```
c( ii[ ii_match[1:3] ], function(x) to[x,] )
```

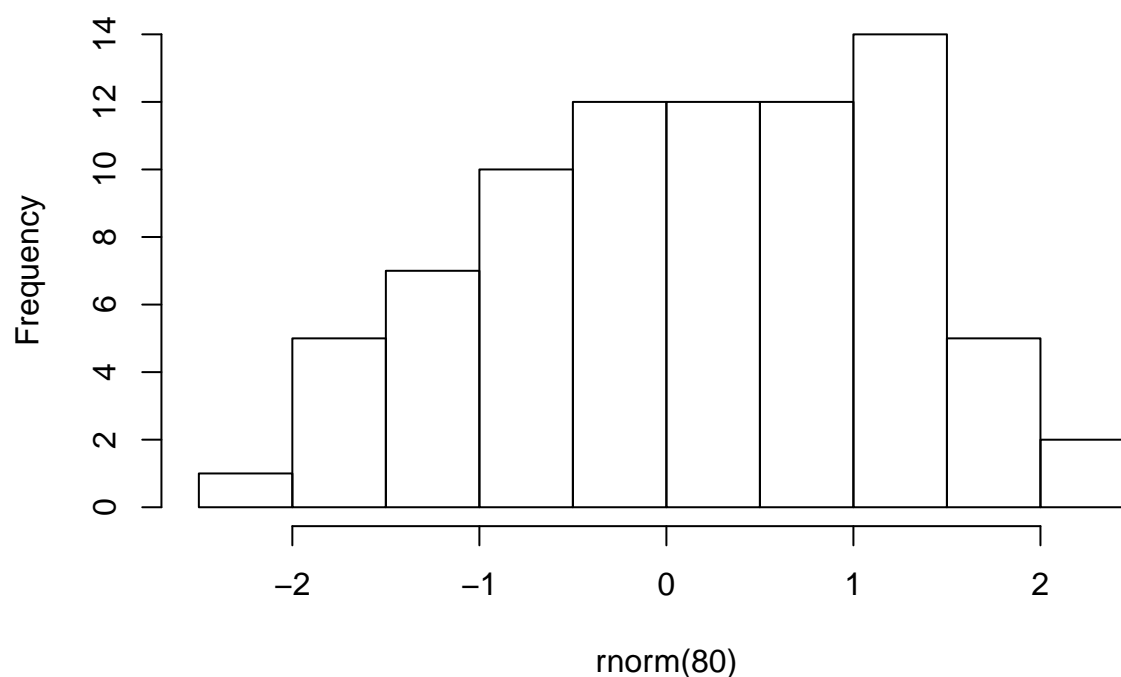
```
## [[1]]
## [1] 267.2997
##
## [[2]]
## [1] 312.3636
##
## [[3]]
## [1] 1401.577
##
## [[4]]
## function(x) to[x,]
```

```
included <- c(unlist( ii ))
dim( included )
```

```
## NULL
```

```
hist(rnorm(80))
```

# Histogram of rnorm(80)



```
fruits <- c(
  type  = c("apple", "orange", "apple", "orange", "orange", "orange"),
  year  = c(2010, 2010, 2012, 2010, 2010, 2012),
  size  = factor(
    c("XS", "S", "M", "S", "S", "M"),
    levels = c("XS", "S", "M", "L")
  ),
  weights = rnorm(10)
)
```

*# All possible combinations -----*  
*# Note that all defined, but not necessarily present, levels of the*  
*# factor variable `size` are retained.*

fruits

##	type1	type2	type3
##	"apple"	"orange"	"apple"
##	type4	type5	type6
##	"orange"	"orange"	"orange"
##	year1	year2	year3
##	"2010"	"2010"	"2012"
##	year4	year5	year6
##	"2010"	"2010"	"2012"
##	size1	size2	size3
##	"1"	"2"	"3"
##	size4	size5	size6

```
##           "2"           "2"           "3"
##      weights1      weights2      weights3
## "-1.70488824313606" "-0.805906604589379" "-0.571055360332163"
##      weights4      weights5      weights6
## "-0.159821663723412" "-0.174308781898206" "0.0752821703930346"
##      weights7      weights8      weights9
## "0.270492443469104"  "1.05127879371614" "-0.570507484187973"
##      weights10
## "-0.686822974820304"
```

```
# Only combinations that already appear in the data -----
# Other uses -----
# Use with `full_seq()` to fill in values of continuous variables
# Use `anti_join()` to determine which observations are missing
all <- fruits
all
```

```
##      type1      type2      type3
## "apple"      "orange"      "apple"
##      type4      type5      type6
## "orange"      "orange"      "orange"
##      year1      year2      year3
## "2010"      "2010"      "2012"
##      year4      year5      year6
## "2010"      "2010"      "2012"
##      size1      size2      size3
## "1"           "2"           "3"
##      size4      size5      size6
## "2"           "2"           "3"
##      weights1      weights2      weights3
## "-1.70488824313606" "-0.805906604589379" "-0.571055360332163"
##      weights4      weights5      weights6
## "-0.159821663723412" "-0.174308781898206" "0.0752821703930346"
##      weights7      weights8      weights9
## "0.270492443469104"  "1.05127879371614" "-0.570507484187973"
##      weights10
## "-0.686822974820304"
```

```
# Use with `right_join()` to fill in missing rows
fruits
```

```
##      type1      type2      type3
## "apple"      "orange"      "apple"
##      type4      type5      type6
## "orange"      "orange"      "orange"
##      year1      year2      year3
## "2010"      "2010"      "2012"
##      year4      year5      year6
## "2010"      "2010"      "2012"
##      size1      size2      size3
## "1"           "2"           "3"
##      size4      size5      size6
## "2"           "2"           "3"
```

```
##           weights1           weights2           weights3
##  "-1.70488824313606" "-0.805906604589379" "-0.571055360332163"
##           weights4           weights5           weights6
##  "-0.159821663723412" "-0.174308781898206" "0.0752821703930346"
##           weights7           weights8           weights9
##  "0.270492443469104"  "1.05127879371614" "-0.570507484187973"
##           weights10
##  "-0.686822974820304"
```