

Lab 7

Marin Azhar

11:59PM April 15, 2021

#Rcpp

We will get some experience with speeding up R code using C++ via the **Rcpp** package.

First, clear the workspace and load the **Rcpp** package.

```
#TO-DO
pacman::p_load(Rcpp)
```

Create a variable **n** to be 10 and a variable **Nvec** to be 100 initially. Create a random vector via **rnorm** **Nvec** times and load it into a **Nvec** x **n** dimensional matrix.

```
#TO-DO
n = 10
Nvec = 100
X = matrix(data = rnorm(Nvec*n), nrow = 100)
head(X)
```

```
##           [,1]      [,2]      [,3]      [,4]      [,5]      [,6]
## [1,] -0.6834808 -1.30457911 -1.0278770 -0.7091122 -0.3588667 -0.7938312
## [2,] -0.2854185  0.77254482 -1.2683973 -0.3131827 -1.5579927  0.6182836
## [3,] -0.2127186  0.90092019  0.2513183  0.2243160 -0.5437677  1.7803803
## [4,]  0.2286666 -0.06374408 -1.4474031  1.5733885  0.6660421 -1.1475801
## [5,] -0.1129078 -0.02359415 -0.4901920 -1.7845102 -1.2944602 -0.5739799
## [6,]  0.2658279  0.64257442  1.3475198  1.6892505  0.2358499 -0.2848843
##           [,7]      [,8]      [,9]      [,10]
## [1,]  0.8783623 -0.5184424 -0.9983798 -0.25648178
## [2,] -0.7699091 -0.2612830  0.4721700  0.39094697
## [3,] -1.3085383  0.7536592  0.3977048 -1.11754252
## [4,]  0.6828859 -0.9714645  2.4128410 -0.43675636
## [5,]  0.8651046  2.4481522  0.9933471 -0.40332703
## [6,]  2.0007758  0.9188241  0.3941356 -0.08542126
```

Write a function **all_angles** that measures the angle between each of the pairs of vectors. You should measure the vector on a scale of 0 to 180 degrees with negative angles coerced to be positive.

```
#TO-DO

angle = function(u,v){
  acos(sum(u*v)/sqrt(sum(u^2)*sum(v^2)))*(180/pi)
}
```

```

all_angles = function(X){
  A = matrix(NA, nrow=nrow(X), ncol=nrow(X))
  for(i in 1:(nrow(X)-1)){
    for(j in (i+1):nrow(X)){
      A[i,j] = angle(X[i,],X[j,])
    }
  }
  A
}
all_angles(X)

```

##		[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]
##	[1,]	NA	92.96163	126.14924	91.33681	81.41249	108.04412	101.50051	89.30027
##	[2,]	NA	NA	66.14781	88.90066	78.21263	119.86235	130.65064	85.92698
##	[3,]	NA	NA	NA	104.77015	86.03254	96.71089	106.26462	98.34278
##	[4,]	NA	NA	NA	NA	96.51874	77.04727	102.32236	111.46164
##	[5,]	NA	NA	NA	NA	NA	87.33802	112.38187	112.04775
##	[6,]	NA	NA	NA	NA	NA	NA	82.00564	103.00972
##	[7,]	NA	NA	NA	NA	NA	NA	NA	63.86235
##	[8,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[9,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[10,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[11,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[12,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[13,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[14,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[15,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[16,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[17,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[18,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[19,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[20,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[21,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[22,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[23,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[24,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[25,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[26,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[27,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[28,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[29,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[30,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[31,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[32,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[33,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[34,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[35,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[36,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA	NA

##	[42,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA	NA

##	[96,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA	NA
##		[,9]	[,10]	[,11]	[,12]	[,13]	[,14]	[,15]	
##	[1,]	56.13061	128.16096	96.33568	63.07440	111.33446	90.36160	120.86324	
##	[2,]	83.52186	81.97685	63.51225	57.92624	74.79280	73.44154	80.89861	
##	[3,]	89.44478	61.06160	75.78117	104.52283	43.63118	64.37778	63.78853	
##	[4,]	121.31606	113.90406	110.05262	106.71648	108.73637	107.72862	65.86154	
##	[5,]	103.20692	81.40243	106.03555	62.47102	88.65334	82.98753	88.01526	
##	[6,]	110.09199	101.72663	113.46293	101.75819	111.99458	87.52168	64.08977	
##	[7,]	96.76046	81.47716	108.94075	120.00398	105.15245	100.13227	119.08837	
##	[8,]	78.65815	101.91719	74.07387	88.57199	115.58430	89.14144	106.86387	
##	[9,]	NA	101.56552	64.38433	67.32418	79.48168	58.03272	109.64924	
##	[10,]	NA	NA	73.94297	91.33310	43.11215	85.58022	91.38220	
##	[11,]	NA	NA	NA	67.96847	65.36019	73.63658	75.31200	
##	[12,]	NA	NA	NA	NA	94.96438	74.78611	100.96035	
##	[13,]	NA	NA	NA	NA	NA	77.66984	80.12661	
##	[14,]	NA	NA	NA	NA	NA	NA	80.71216	
##	[15,]	NA	NA	NA	NA	NA	NA	NA	
##	[16,]	NA	NA	NA	NA	NA	NA	NA	
##	[17,]	NA	NA	NA	NA	NA	NA	NA	
##	[18,]	NA	NA	NA	NA	NA	NA	NA	
##	[19,]	NA	NA	NA	NA	NA	NA	NA	
##	[20,]	NA	NA	NA	NA	NA	NA	NA	
##	[21,]	NA	NA	NA	NA	NA	NA	NA	
##	[22,]	NA	NA	NA	NA	NA	NA	NA	
##	[23,]	NA	NA	NA	NA	NA	NA	NA	
##	[24,]	NA	NA	NA	NA	NA	NA	NA	
##	[25,]	NA	NA	NA	NA	NA	NA	NA	
##	[26,]	NA	NA	NA	NA	NA	NA	NA	
##	[27,]	NA	NA	NA	NA	NA	NA	NA	
##	[28,]	NA	NA	NA	NA	NA	NA	NA	
##	[29,]	NA	NA	NA	NA	NA	NA	NA	
##	[30,]	NA	NA	NA	NA	NA	NA	NA	
##	[31,]	NA	NA	NA	NA	NA	NA	NA	
##	[32,]	NA	NA	NA	NA	NA	NA	NA	
##	[33,]	NA	NA	NA	NA	NA	NA	NA	
##	[34,]	NA	NA	NA	NA	NA	NA	NA	
##	[35,]	NA	NA	NA	NA	NA	NA	NA	
##	[36,]	NA	NA	NA	NA	NA	NA	NA	
##	[37,]	NA	NA	NA	NA	NA	NA	NA	
##	[38,]	NA	NA	NA	NA	NA	NA	NA	
##	[39,]	NA	NA	NA	NA	NA	NA	NA	
##	[40,]	NA	NA	NA	NA	NA	NA	NA	
##	[41,]	NA	NA	NA	NA	NA	NA	NA	
##	[42,]	NA	NA	NA	NA	NA	NA	NA	
##	[43,]	NA	NA	NA	NA	NA	NA	NA	
##	[44,]	NA	NA	NA	NA	NA	NA	NA	
##	[45,]	NA	NA	NA	NA	NA	NA	NA	
##	[46,]	NA	NA	NA	NA	NA	NA	NA	
##	[47,]	NA	NA	NA	NA	NA	NA	NA	
##	[48,]	NA	NA	NA	NA	NA	NA	NA	

##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,16]	[,17]	[,18]	[,19]	[,20]	[,21]	[,22]
##	[1,]	99.23899	67.30492	82.90617	92.21570	79.39312	125.05783	108.08541

##	[2,]	119.92448	75.33580	110.89758	121.58660	88.20434	103.02694	68.95935
##	[3,]	91.65655	88.20636	105.22732	78.42957	89.40283	62.27731	83.43537
##	[4,]	87.78692	88.57858	97.81250	79.00961	125.26780	95.22395	77.55021
##	[5,]	69.08589	63.80883	113.69746	91.27715	53.86534	68.58181	116.78681
##	[6,]	59.05590	116.55986	98.05791	80.46275	93.18601	49.45812	114.07163
##	[7,]	76.12192	115.50133	83.74683	79.05632	88.66779	86.80893	100.80121
##	[8,]	89.93024	90.22122	73.48421	111.68530	104.09557	99.21487	93.50844
##	[9,]	109.40839	84.97061	89.03869	88.28098	70.00873	120.70246	92.37257
##	[10,]	94.86657	104.64493	99.14571	92.98717	63.68926	80.23622	65.72763
##	[11,]	105.00988	84.41584	73.64419	104.88164	90.14323	113.87810	46.78589
##	[12,]	105.21917	78.92081	101.96732	127.50647	56.17662	110.54102	89.11674
##	[13,]	107.22717	86.40273	93.10762	76.58921	73.85462	89.04189	62.69209
##	[14,]	77.85253	100.09185	130.28489	77.90098	64.74042	86.76540	97.87103
##	[15,]	69.59809	84.00053	92.03927	74.69273	112.75018	63.99158	75.87117
##	[16,]	NA	86.87263	95.54301	58.22029	86.58507	56.19922	116.54043
##	[17,]	NA	NA	77.10114	80.04927	90.41232	98.18504	95.55856
##	[18,]	NA	NA	NA	95.14991	117.85776	99.48059	77.18756
##	[19,]	NA	NA	NA	NA	91.01903	79.57438	99.56496
##	[20,]	NA	NA	NA	NA	NA	89.91774	105.70586
##	[21,]	NA	NA	NA	NA	NA	NA	121.01759
##	[22,]	NA	NA	NA	NA	NA	NA	NA
##	[23,]	NA	NA	NA	NA	NA	NA	NA
##	[24,]	NA	NA	NA	NA	NA	NA	NA
##	[25,]	NA	NA	NA	NA	NA	NA	NA
##	[26,]	NA	NA	NA	NA	NA	NA	NA
##	[27,]	NA	NA	NA	NA	NA	NA	NA
##	[28,]	NA	NA	NA	NA	NA	NA	NA
##	[29,]	NA	NA	NA	NA	NA	NA	NA
##	[30,]	NA	NA	NA	NA	NA	NA	NA
##	[31,]	NA	NA	NA	NA	NA	NA	NA
##	[32,]	NA	NA	NA	NA	NA	NA	NA
##	[33,]	NA	NA	NA	NA	NA	NA	NA
##	[34,]	NA	NA	NA	NA	NA	NA	NA
##	[35,]	NA	NA	NA	NA	NA	NA	NA
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA

##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,23]	[,24]	[,25]	[,26]	[,27]	[,28]	[,29]
##	[1,]	100.25705	67.70055	110.63606	115.41352	60.29615	129.80918	69.38425
##	[2,]	56.58168	94.38858	119.70312	72.43670	93.14959	85.63976	93.43687
##	[3,]	81.19470	127.84397	75.57356	50.51787	106.88566	65.31978	104.98930
##	[4,]	96.63428	53.81703	94.64061	72.79703	117.68956	88.46679	38.11183
##	[5,]	62.26077	84.45967	104.73476	88.50339	103.02739	97.24426	79.43648
##	[6,]	78.41951	74.48668	61.99312	90.04270	107.83458	87.24298	90.27612
##	[7,]	102.62902	100.84691	71.64809	118.68839	82.65962	68.23289	108.87186
##	[8,]	88.26391	86.14057	79.34768	101.61840	85.00010	60.54885	126.50741

##	[9,]	94.72397	97.35384	106.74424	111.25408	54.95985	112.16214	107.06247
##	[10,]	79.99174	134.11269	97.82441	84.97386	90.96791	81.95017	111.42663
##	[11,]	92.99933	93.94554	107.46535	79.22036	88.98026	91.30395	115.88409
##	[12,]	55.06839	78.20501	131.66026	109.82328	71.65243	119.42339	99.13826
##	[13,]	97.73261	133.83090	98.93088	71.64233	86.05978	92.53090	99.17914
##	[14,]	62.99942	95.93333	98.29689	84.22118	99.30979	86.90305	100.15477
##	[15,]	89.17770	72.77231	77.54160	44.77588	139.51445	72.36715	82.05380
##	[16,]	92.49796	69.40984	66.00504	77.97050	133.03405	70.95612	83.63739
##	[17,]	104.90472	70.84395	106.84386	83.59955	99.97648	84.98482	79.37230
##	[18,]	137.70469	87.63755	69.77714	87.62084	76.44599	96.33733	99.69062
##	[19,]	121.76878	85.81070	78.09886	79.74947	113.55498	79.70505	68.92968
##	[20,]	63.25713	106.00198	118.46903	121.36944	72.11337	108.57322	105.17561
##	[21,]	75.51375	102.49446	47.29759	66.99733	116.62064	66.14127	99.75926
##	[22,]	102.20831	94.19803	112.44849	75.75817	93.85033	91.38054	89.31110
##	[23,]	NA	92.21940	106.53458	95.90120	94.02175	85.86304	103.16369
##	[24,]	NA	NA	103.39241	94.79664	114.03819	91.79491	64.42892
##	[25,]	NA	NA	NA	65.46848	100.57930	71.68791	98.07257
##	[26,]	NA	NA	NA	NA	128.43073	74.43361	73.61824
##	[27,]	NA	NA	NA	NA	NA	126.66602	105.48205
##	[28,]	NA	NA	NA	NA	NA	NA	110.07348
##	[29,]	NA	NA	NA	NA	NA	NA	NA
##	[30,]	NA	NA	NA	NA	NA	NA	NA
##	[31,]	NA	NA	NA	NA	NA	NA	NA
##	[32,]	NA	NA	NA	NA	NA	NA	NA
##	[33,]	NA	NA	NA	NA	NA	NA	NA
##	[34,]	NA	NA	NA	NA	NA	NA	NA
##	[35,]	NA	NA	NA	NA	NA	NA	NA
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA

##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,30]	[,31]	[,32]	[,33]	[,34]	[,35]	[,36]
##	[1,]	111.20300	82.90801	69.44965	98.55994	73.74304	69.80843	123.31421
##	[2,]	86.97624	67.81577	88.90540	86.29554	97.01883	102.83419	76.47578
##	[3,]	73.78741	61.11909	124.16422	71.83129	130.30815	91.43575	77.23622
##	[4,]	87.21083	79.99520	63.97809	92.12547	68.06450	95.82753	88.09594
##	[5,]	91.79708	86.09856	123.01233	97.89656	106.08676	96.90609	75.73459
##	[6,]	65.81474	102.21706	94.99740	107.60992	102.28214	111.50190	94.61472
##	[7,]	86.30742	128.10554	89.71627	75.91094	71.86395	101.95678	93.23580
##	[8,]	99.44339	120.07128	73.32840	88.09264	79.78982	98.69293	102.60102
##	[9,]	86.52733	66.17885	89.83480	87.98515	89.31050	76.79100	125.13679
##	[10,]	85.85016	90.12900	127.68401	71.22074	98.05038	92.20133	42.33446
##	[11,]	99.13714	72.65607	93.97707	89.34970	83.87892	71.27858	78.83366
##	[12,]	94.42151	85.33907	91.03975	106.46980	85.40955	96.79739	86.78517
##	[13,]	82.02516	58.13278	121.56432	76.19611	111.39958	73.56296	70.54380
##	[14,]	74.28790	51.61875	124.77047	62.26153	92.61950	99.08256	94.85179
##	[15,]	75.82028	66.31905	101.76261	99.59294	104.77570	89.64522	80.20003

##	[16,]	95.60539	94.19660	121.53359	81.43958	87.02279	86.45692	84.60524
##	[17,]	97.86730	79.13705	91.60246	111.89053	97.60390	73.64833	106.58939
##	[18,]	119.12267	112.79795	63.59820	112.81012	91.96623	51.37390	97.64999
##	[19,]	79.77126	63.97731	114.65481	74.97387	87.62390	73.88834	104.84379
##	[20,]	77.51207	85.02831	129.23501	87.87568	94.09814	101.16614	83.60028
##	[21,]	74.30810	100.41447	118.54307	94.59208	133.42876	105.81130	79.96039
##	[22,]	97.86452	76.09975	79.67809	81.69782	67.29487	75.88158	61.94196
##	[23,]	69.25554	91.32567	104.69095	88.22549	98.73822	136.85317	74.42042
##	[24,]	93.15688	90.94807	68.60026	111.47736	59.86905	93.14513	106.55817
##	[25,]	97.96219	106.89757	90.57279	84.65897	117.61132	80.68188	94.08847
##	[26,]	105.07623	63.76215	101.17732	72.06979	108.99222	70.06785	67.72288
##	[27,]	94.07889	101.84378	68.88733	99.69774	94.14984	84.17901	108.63903
##	[28,]	71.37645	102.50021	101.09585	82.15426	95.92216	114.83442	86.77880
##	[29,]	106.23398	66.83940	78.79668	79.06967	70.59688	73.59896	87.97723
##	[30,]	NA	83.66862	99.38767	108.45806	106.68534	138.06811	108.76157
##	[31,]	NA	NA	109.00112	69.98617	92.88793	73.36191	94.07305
##	[32,]	NA	NA	NA	111.03134	73.35039	89.73574	111.47478
##	[33,]	NA	NA	NA	NA	72.38222	79.59246	67.34992
##	[34,]	NA	NA	NA	NA	NA	85.91888	83.54848
##	[35,]	NA	NA	NA	NA	NA	NA	87.15278
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA

##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,37]	[,38]	[,39]	[,40]	[,41]	[,42]	[,43]
##	[1,]	85.71328	88.87987	144.57788	92.59273	80.57686	64.36607	95.39872
##	[2,]	95.24121	117.68412	104.63905	51.87437	88.97980	63.93323	21.53727
##	[3,]	91.80135	93.46660	72.03985	64.91486	111.24698	104.50312	74.74008
##	[4,]	111.62249	93.47519	75.46330	99.01045	82.70229	104.85690	89.61710
##	[5,]	109.47742	110.22272	99.76969	73.77255	130.78212	93.77550	73.06229
##	[6,]	99.67380	86.46539	73.12182	123.28868	101.82004	123.46690	122.27939
##	[7,]	78.85927	77.21631	72.25480	115.60042	78.64180	92.30996	124.26063
##	[8,]	56.98379	106.74871	97.45724	84.98471	43.07741	40.49518	85.53057
##	[9,]	69.64351	73.17124	125.58974	93.70480	81.23931	65.48702	95.50797
##	[10,]	102.06949	76.27179	60.69051	73.59743	120.86592	107.30294	73.20711
##	[11,]	74.24491	75.53945	85.21667	69.54956	73.06485	63.33064	64.34461
##	[12,]	93.45239	102.22482	126.10754	76.52959	95.71539	60.14290	55.88542
##	[13,]	92.01483	71.61197	73.73840	73.21671	117.19451	110.90948	77.20391
##	[14,]	104.98694	72.89735	95.19287	78.47305	110.56809	79.32763	85.82642
##	[15,]	95.78286	89.28434	56.15991	87.16379	94.26819	109.03981	86.06957
##	[16,]	102.66427	78.37455	64.65204	93.71436	105.14693	98.39613	116.20621
##	[17,]	66.27646	114.32751	101.23857	79.84715	81.61798	72.21405	77.13509
##	[18,]	55.65997	86.00473	89.35034	93.89893	54.73885	83.97119	103.33830
##	[19,]	93.23426	59.96184	64.57310	107.71820	105.81812	116.84852	130.37265
##	[20,]	99.54930	81.70806	103.38605	92.26878	130.29408	91.60713	86.82955
##	[21,]	97.48050	104.62556	68.54565	91.13111	115.97323	122.39491	103.03028
##	[22,]	91.99243	71.09158	66.67011	76.65562	76.23321	86.02728	64.20291

##	[23,]	111.01048	114.94731	101.38539	78.18359	110.81523	81.12458	58.28067
##	[24,]	89.27757	96.60147	92.27987	105.90959	67.99059	73.57213	95.00411
##	[25,]	85.58506	89.41504	76.61391	91.29512	85.59088	108.87110	119.78104
##	[26,]	108.36497	90.22365	68.49941	52.44023	97.72794	100.52228	73.53019
##	[27,]	74.02077	87.95358	133.07769	99.66736	83.28481	82.31744	93.52433
##	[28,]	72.41932	110.53638	54.44918	89.12217	74.80642	84.09999	88.30658
##	[29,]	126.08169	81.33538	92.55742	85.23975	102.57472	104.87149	92.43234
##	[30,]	76.16814	101.40023	77.56684	127.84777	97.91465	111.81740	100.02218
##	[31,]	108.80312	68.30056	91.95951	73.92833	110.80975	96.00644	80.66798
##	[32,]	72.92002	105.89629	111.08454	103.45522	40.64836	74.49085	89.00887
##	[33,]	125.46988	61.58415	79.79624	59.40967	106.82228	85.59215	85.41681
##	[34,]	102.95296	66.03854	83.91517	95.89359	71.94586	68.05109	90.85458
##	[35,]	90.78540	59.37520	94.36683	69.26436	87.48982	87.61961	97.83614
##	[36,]	126.29394	81.51568	61.10748	56.61682	115.03880	99.87810	60.23193
##	[37,]	NA	108.49722	95.64893	112.28426	48.77521	72.55357	100.93593
##	[38,]	NA	NA	72.96590	96.48288	103.58593	105.06194	116.63928
##	[39,]	NA	NA	NA	97.47264	96.34620	117.30680	99.91359
##	[40,]	NA	NA	NA	NA	100.02211	67.72744	44.10508
##	[41,]	NA	NA	NA	NA	NA	54.72310	90.90494
##	[42,]	NA	NA	NA	NA	NA	NA	63.77748
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA

##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,44]	[,45]	[,46]	[,47]	[,48]	[,49]	[,50]
##	[1,]	79.94970	67.82696	76.88869	50.70326	83.40976	66.07910	97.60072
##	[2,]	64.04633	97.02177	109.18906	88.88024	69.18843	98.41018	82.02021
##	[3,]	86.73173	87.95100	116.35391	126.05178	108.79968	84.08194	89.97156
##	[4,]	45.97527	109.40123	87.35857	72.43665	83.52017	129.06666	100.71600
##	[5,]	76.20836	85.06165	108.58227	95.64211	117.52682	97.74362	79.85530
##	[6,]	91.75446	98.77601	87.36461	98.18558	99.58540	104.41210	96.55655
##	[7,]	124.90499	95.02283	84.38727	99.53790	84.18162	80.28161	82.27452
##	[8,]	121.77278	66.33279	110.80649	88.99234	41.49042	78.82380	77.69986
##	[9,]	100.12210	68.37332	77.99362	75.68616	79.19326	51.98243	109.60138
##	[10,]	109.00253	112.35631	81.01948	116.60063	114.84122	96.34602	72.92646
##	[11,]	110.65248	75.55826	81.10520	83.87683	72.00391	97.35051	94.67097
##	[12,]	85.58937	87.99353	82.33093	69.41483	76.01413	89.92040	83.80975
##	[13,]	90.95667	100.22430	83.54135	115.47110	121.52762	82.53202	98.18009
##	[14,]	93.49404	73.11192	95.33598	81.84856	90.95522	85.39649	92.28030
##	[15,]	76.49278	86.33650	104.97793	101.53053	96.31916	128.08303	107.11627
##	[16,]	108.48382	60.99460	104.06303	89.32417	109.14930	110.32833	85.44721
##	[17,]	73.17622	65.38974	120.96654	96.51091	91.63197	90.93354	112.86701
##	[18,]	115.96046	70.82055	80.20520	90.69107	85.13719	79.30800	93.78837
##	[19,]	87.50692	76.09456	92.48678	97.04718	121.52802	93.17090	119.53572
##	[20,]	99.56448	95.74703	80.29175	94.78775	111.67978	77.13454	88.29262
##	[21,]	94.85052	88.37919	118.07415	126.50677	116.84555	92.93804	80.09487
##	[22,]	90.05853	108.21818	66.67897	82.69026	77.98054	116.26137	92.73917
##	[23,]	77.84051	107.82704	103.73580	92.53958	78.49757	99.15689	70.11810
##	[24,]	73.37176	77.47813	93.47753	60.01928	66.67854	123.78115	108.29233
##	[25,]	111.06506	71.53118	102.87806	106.41410	102.28119	75.65967	75.48268
##	[26,]	79.35396	75.29109	107.60950	94.24376	104.55200	108.21119	77.74956
##	[27,]	98.13541	99.95196	63.15813	84.14240	85.01800	39.94899	88.11054
##	[28,]	97.64342	86.39805	137.72462	123.94823	73.65721	105.74821	92.37246
##	[29,]	48.90553	93.84906	78.44980	59.16801	107.00714	109.12513	91.97322

##	[30,]	71.73057	120.65111	104.87906	125.36412	85.45377	93.01815	127.65805
##	[31,]	64.18900	81.31433	86.24673	77.96472	106.20277	93.61434	109.62828
##	[32,]	74.86914	99.81996	79.98863	69.91422	50.76349	86.18291	94.85468
##	[33,]	99.44499	82.06571	82.35227	72.85152	100.14270	88.86468	59.72999
##	[34,]	93.79369	92.86254	62.83885	46.46084	67.22579	115.81619	87.46092
##	[35,]	105.69396	55.84683	68.79312	68.82146	111.96016	79.21733	86.25541
##	[36,]	99.32856	107.31721	78.43983	90.53561	106.76480	120.83608	49.77230
##	[37,]	105.78282	77.42828	109.90294	116.38594	65.44348	68.90066	121.80195
##	[38,]	112.94536	83.49815	42.45874	67.79749	111.74863	92.14946	93.49800
##	[39,]	101.44809	103.08223	93.09683	113.72143	102.58156	129.65441	95.64396
##	[40,]	91.10689	70.57506	101.08176	78.06019	94.55140	91.72392	48.78252
##	[41,]	98.71317	77.58870	97.55919	81.07464	34.49286	88.65022	101.24114
##	[42,]	102.16883	60.57163	103.07141	64.88661	43.69462	84.52095	78.62032
##	[43,]	72.64323	99.42869	102.59779	85.90742	73.20439	104.93811	68.17819
##	[44,]	NA	114.18138	101.02094	86.55590	90.10053	102.97273	108.08638
##	[45,]	NA	NA	106.07859	74.11061	89.29221	76.05444	86.36021
##	[46,]	NA	NA	NA	58.40145	100.60683	89.52880	85.32274
##	[47,]	NA	NA	NA	NA	76.27657	97.91725	75.26476
##	[48,]	NA	NA	NA	NA	NA	96.16838	92.99192
##	[49,]	NA	NA	NA	NA	NA	NA	88.36685
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA

##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##	[,51]	[,52]	[,53]	[,54]	[,55]	[,56]	[,57]	
##	[1,]	96.28040	95.39164	86.99857	66.63064	120.46785	73.12799	54.67292
##	[2,]	112.37632	87.71696	77.53000	98.47164	114.62260	76.99140	88.45843
##	[3,]	110.14031	75.82208	68.55210	80.98278	72.38883	119.72577	88.30409
##	[4,]	65.21078	107.99719	136.13056	96.88779	95.32768	76.35538	113.20774
##	[5,]	130.27883	115.77677	87.08733	66.63206	88.81302	80.67996	93.95176
##	[6,]	63.79206	90.16236	122.31089	75.38750	81.19408	100.81737	116.82594
##	[7,]	74.11738	72.90802	83.66941	120.77939	65.55218	81.40370	100.56841
##	[8,]	87.15218	38.00204	57.56048	117.64861	112.78024	81.66636	74.58625
##	[9,]	98.53968	72.90275	71.56352	67.10617	104.20578	103.83007	59.20121
##	[10,]	105.12713	110.10436	80.95603	107.42815	54.04557	99.63418	112.38360
##	[11,]	93.28876	84.39281	79.43656	90.78220	103.65006	118.46806	85.44191
##	[12,]	109.37849	104.69609	87.84449	79.50260	120.99160	73.96507	86.35557
##	[13,]	112.31958	105.54023	76.62094	82.08481	58.24617	119.13549	89.08437
##	[14,]	94.60239	75.81126	91.01140	65.29591	97.90250	111.62920	96.97862
##	[15,]	83.09852	91.99982	112.85740	72.19205	87.04196	126.88217	110.84677
##	[16,]	86.28827	88.09767	102.78056	69.34991	82.24835	112.83959	105.60103
##	[17,]	136.77632	92.61362	68.40192	72.34154	94.36592	93.70575	63.99323
##	[18,]	81.29014	82.80966	73.58482	93.22222	94.60780	104.50650	59.20578
##	[19,]	91.01512	93.88056	102.52774	63.93852	56.64899	123.85491	94.73864
##	[20,]	120.73191	111.20101	83.64561	74.89601	74.54462	86.39070	97.96218
##	[21,]	94.95703	80.91056	86.48846	76.88517	71.49722	105.24522	100.59089
##	[22,]	77.53629	106.89795	102.50827	114.59389	87.20602	99.69375	106.24784
##	[23,]	100.22826	89.84020	93.57617	96.00635	104.16403	66.27503	113.67832
##	[24,]	78.15811	95.39450	121.75323	81.34686	114.94374	83.46065	100.98621
##	[25,]	68.42267	60.48196	79.57137	83.83935	86.25635	109.66034	76.52201
##	[26,]	84.68456	86.48545	92.12690	78.07810	97.23522	117.23983	88.14768
##	[27,]	92.07759	89.35235	69.62767	93.70238	95.73741	70.07328	59.51072
##	[28,]	98.97848	55.41361	73.45391	115.82849	73.92108	96.41631	105.17765
##	[29,]	77.28459	121.67591	126.14904	75.54633	97.45760	78.98402	94.43631
##	[30,]	100.23673	82.35144	98.09095	91.22751	60.75944	92.62728	115.87838
##	[31,]	96.62858	100.38361	102.55877	55.21337	92.31654	117.72814	88.01915
##	[32,]	63.83950	79.87301	96.16768	111.89830	118.00483	61.26729	74.56015
##	[33,]	76.36135	86.09569	90.86261	97.40598	89.87693	93.97646	96.64098
##	[34,]	65.51046	103.86041	118.62269	112.04928	100.79474	73.93412	110.72081
##	[35,]	85.28633	101.13853	83.54916	65.98033	98.01811	118.46198	56.69935
##	[36,]	85.95971	119.46606	100.73710	110.26930	82.15991	88.09880	120.16354

##	[37,]	108.57774	57.19732	54.44271	96.75973	84.36307	99.04431	63.65406
##	[38,]	61.95596	107.16819	114.28506	75.64556	75.94070	122.33311	100.43083
##	[39,]	79.15775	97.66189	108.47703	106.59874	51.26905	115.80962	131.91113
##	[40,]	102.34116	90.20787	70.08335	89.98957	115.63791	90.31911	75.08491
##	[41,]	74.46463	55.45424	78.21309	114.98681	113.97902	82.99175	72.48245
##	[42,]	99.12701	63.79300	65.50475	102.22829	134.06704	75.26945	69.02735
##	[43,]	110.54562	97.95961	78.67205	107.19747	113.81683	70.63546	92.36415
##	[44,]	98.44710	107.45197	110.48290	83.26424	95.29621	68.34262	96.12493
##	[45,]	96.79402	63.88900	67.49555	59.16895	115.49723	117.45720	53.81309
##	[46,]	56.41745	123.29497	120.49325	88.88861	88.64083	91.32598	99.06022
##	[47,]	60.78275	102.25633	116.24623	81.63401	133.42223	78.40675	85.65055
##	[48,]	77.69456	57.26646	84.70625	121.42726	123.40630	68.33201	89.26994
##	[49,]	102.00466	66.00655	48.57311	77.35433	92.15245	87.72813	39.76303
##	[50,]	78.19167	90.72801	81.34086	107.88415	110.55539	69.70654	89.49787
##	[51,]	NA	86.64020	126.93282	100.42987	103.62861	91.78713	105.49518
##	[52,]	NA	NA	56.40647	97.63231	105.49201	96.77238	67.12309
##	[53,]	NA	NA	NA	95.36332	91.33587	90.21564	46.80241
##	[54,]	NA	NA	NA	NA	96.09487	123.04038	70.44029
##	[55,]	NA	NA	NA	NA	NA	105.12407	112.10242
##	[56,]	NA	NA	NA	NA	NA	NA	93.40498
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA

##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,58]	[,59]	[,60]	[,61]	[,62]	[,63]	[,64]
##	[1,]	126.81117	86.84353	104.69138	83.28171	85.89616	85.65498	109.82154
##	[2,]	95.01499	112.98407	87.41001	85.18562	104.48231	105.54867	83.06240
##	[3,]	49.22614	113.98617	67.21112	79.10392	99.67253	92.79466	80.88102
##	[4,]	92.78485	64.31990	78.59315	132.64871	112.30297	100.34142	95.62673
##	[5,]	66.70054	137.73741	95.28994	74.56062	94.69651	59.21990	61.21659
##	[6,]	66.81981	78.55979	77.74506	109.20083	83.49021	52.68843	48.04190
##	[7,]	98.14598	59.19156	106.38940	67.54310	89.21244	86.88687	98.27292
##	[8,]	114.35207	69.63347	113.93000	70.61340	89.81944	106.85781	99.60617
##	[9,]	111.16405	85.55706	97.73932	69.66975	73.95734	95.47113	104.19269
##	[10,]	68.85070	119.40553	81.18833	72.19422	87.19653	95.45792	84.04275
##	[11,]	98.64586	97.00480	87.39807	96.97544	74.88223	131.67837	104.39473
##	[12,]	109.78834	117.15161	102.36791	79.97874	79.10049	82.28635	71.99937
##	[13,]	63.47395	118.90692	74.82954	84.39696	80.90340	103.93046	98.39764
##	[14,]	83.53650	92.30118	70.79714	62.33164	109.12099	83.96594	76.21065
##	[15,]	52.54427	91.74157	67.83730	129.97183	91.67735	98.97248	73.89169
##	[16,]	64.67737	86.75995	82.05027	87.38830	102.78799	76.54641	78.16864
##	[17,]	78.95119	108.06823	119.45331	95.27736	77.17660	102.68266	103.58561
##	[18,]	100.46637	85.00067	100.89426	114.90007	58.09408	112.57843	119.98475
##	[19,]	62.11932	73.88904	82.31045	93.15614	95.11885	92.30977	105.45661
##	[20,]	82.89670	120.61092	101.56636	51.39483	78.34568	62.59795	67.64541
##	[21,]	38.52614	108.75798	74.97159	87.95432	93.52954	52.74592	49.63672
##	[22,]	101.45902	84.35698	80.47145	114.92615	87.50722	144.17521	115.49889
##	[23,]	86.97049	109.84979	87.30602	68.31816	105.66068	62.00583	39.48061
##	[24,]	102.77379	65.44467	104.32223	120.08189	91.67050	96.89491	89.34240
##	[25,]	71.94809	82.59248	68.02261	94.11407	95.84123	75.65378	86.68753
##	[26,]	65.59394	103.00325	47.38320	110.25665	116.99787	106.64986	95.77638
##	[27,]	121.98913	94.53898	103.80102	72.43967	65.57554	79.39695	99.26951
##	[28,]	65.18548	76.15968	103.00347	82.03668	101.31591	101.85901	83.86055
##	[29,]	96.21439	82.46998	69.58294	113.20100	119.28231	92.68343	107.07569
##	[30,]	61.54503	80.54597	106.58951	90.05423	72.79024	69.75871	53.84470
##	[31,]	79.33359	96.28212	61.65157	95.03605	105.97556	103.13573	100.11427
##	[32,]	130.60991	59.28097	102.68916	117.93833	83.56334	104.07286	108.15259
##	[33,]	99.26380	83.49812	54.57261	61.22985	142.38363	104.20502	111.72226
##	[34,]	130.55299	54.37683	96.67287	94.33902	106.08759	119.97538	118.16872
##	[35,]	98.91301	98.13957	71.04531	102.19370	86.82929	115.51765	135.81017
##	[36,]	81.93534	115.95107	64.44470	90.16108	109.60622	99.99483	84.86765
##	[37,]	88.64110	79.52708	136.35951	92.44301	44.17626	101.69113	98.09481
##	[38,]	96.71201	74.50444	62.25939	92.68731	92.66250	105.01941	114.00594
##	[39,]	56.44500	79.30179	80.47331	107.73320	93.11091	107.60925	88.66207
##	[40,]	95.12983	122.72514	63.28510	75.54905	123.12684	107.74945	102.53376
##	[41,]	120.79343	52.70538	115.30344	107.20929	77.83277	122.62594	114.62546
##	[42,]	128.92895	83.66608	111.02652	71.19738	97.37706	114.49042	107.02072
##	[43,]	98.72488	119.97184	87.65060	85.88552	104.95250	107.60133	85.55474

##	[44,]	84.76092	91.57263	87.31426	109.69315	104.76531	83.47882	82.03113
##	[45,]	93.47491	91.62539	86.85324	79.71343	94.99511	99.47688	108.87027
##	[46,]	117.77573	80.79782	71.71847	101.92466	81.88992	95.95069	105.87426
##	[47,]	139.48704	73.01012	72.97378	96.12644	113.86059	103.50271	112.76646
##	[48,]	125.73518	58.29956	113.87943	93.64686	90.15489	112.07493	94.17617
##	[49,]	100.68239	97.77745	96.32237	58.01214	76.51116	71.43168	98.67724
##	[50,]	106.48483	108.50860	64.57617	67.93672	123.59441	83.91243	88.16205
##	[51,]	113.84441	49.51041	59.12689	114.08471	105.47517	97.04775	98.59577
##	[52,]	94.25222	68.23965	98.68245	73.04715	93.53954	93.58328	91.42751
##	[53,]	87.59061	111.50913	111.33885	55.47383	78.07953	92.36386	98.94591
##	[54,]	70.82508	108.02375	73.11654	94.47542	82.91827	69.30791	82.15567
##	[55,]	50.60873	92.72039	99.02211	86.31261	72.26921	83.07232	85.15984
##	[56,]	120.81436	87.43390	110.14150	77.21108	103.67589	76.54710	83.63622
##	[57,]	104.71325	100.84422	96.52160	79.54980	79.25613	92.22138	115.50379
##	[58,]	NA	113.15091	84.68453	95.41358	80.64251	71.99016	61.91911
##	[59,]	NA	NA	96.13304	103.62550	97.27146	107.85540	109.51168
##	[60,]	NA	NA	NA	98.59214	124.50416	89.36119	91.34104
##	[61,]	NA	NA	NA	NA	104.19152	73.37075	85.79567
##	[62,]	NA	NA	NA	NA	NA	85.47556	82.49991
##	[63,]	NA	NA	NA	NA	NA	NA	41.65095
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA

##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,65]	[,66]	[,67]	[,68]	[,69]	[,70]	[,71]
##	[1,]	80.11754	90.51814	102.75331	76.51891	75.67960	114.10180	112.18659
##	[2,]	87.76240	77.69642	87.32514	122.06117	88.60525	62.38321	83.61566
##	[3,]	107.99509	72.23484	67.86783	114.61380	88.85589	52.88848	63.32718
##	[4,]	85.99155	131.27303	115.17096	71.37069	72.36853	111.95753	90.59846
##	[5,]	98.80936	92.73704	87.67547	108.26048	91.36396	91.50868	60.81835
##	[6,]	83.69150	128.53731	74.10459	74.07603	65.60226	99.08473	98.36323
##	[7,]	85.30582	89.36652	82.82840	83.38828	105.75170	91.00500	80.26996
##	[8,]	89.72465	89.53303	83.73378	115.86345	83.23680	52.03251	99.23595
##	[9,]	85.51870	59.45197	74.00924	94.74789	79.19775	91.04182	119.24056
##	[10,]	91.75956	50.70393	76.76267	104.12200	143.12036	83.23205	65.03376
##	[11,]	93.27313	56.36732	84.97686	116.03200	101.73532	75.20084	119.73416
##	[12,]	75.07712	76.18023	84.21547	107.07070	92.53283	93.00019	108.85530
##	[13,]	106.48582	41.44277	84.93678	95.67123	119.49657	87.31171	75.03650
##	[14,]	75.45506	82.76502	34.99730	125.85638	67.51972	72.24370	93.93743
##	[15,]	108.33070	109.59250	89.22084	101.60641	67.39310	80.96536	94.22819
##	[16,]	96.80229	117.26440	73.60161	107.67557	72.60264	87.30359	79.85688
##	[17,]	136.10627	81.32055	125.96548	104.56129	82.74768	88.72986	77.41078
##	[18,]	107.47863	82.28881	122.79986	68.40820	101.99324	94.32817	114.28211
##	[19,]	112.50840	93.01053	89.25253	85.13765	77.85829	107.42306	77.01039
##	[20,]	84.69466	59.75709	67.85254	103.13217	109.36696	101.56999	78.74812
##	[21,]	102.75093	111.93545	70.95289	95.47733	77.14894	68.02274	61.81589
##	[22,]	87.39582	66.45935	104.91292	92.27158	119.44504	95.91526	106.10970
##	[23,]	68.10912	97.71735	58.72492	117.26079	82.92380	69.80557	78.21038
##	[24,]	92.31837	127.34360	110.29628	91.42307	58.85921	108.61992	112.30314
##	[25,]	92.23100	114.69541	76.67299	78.84487	73.41100	67.61516	85.70006
##	[26,]	96.30655	104.52058	84.84065	103.92034	77.39348	64.64293	80.26995
##	[27,]	74.71606	61.50716	93.08264	61.66163	107.59871	103.51520	107.47017
##	[28,]	117.00111	98.04497	86.57790	123.08426	82.54476	49.72639	59.24944
##	[29,]	79.96065	118.71963	109.03569	68.80902	77.81141	122.36669	86.10617
##	[30,]	108.57367	87.88413	82.73615	90.43194	77.00936	90.47122	78.49239
##	[31,]	90.73734	80.00941	76.85339	100.55587	73.18538	94.82487	94.42573
##	[32,]	80.30774	108.53373	122.77160	58.72186	79.96799	100.08844	118.01393
##	[33,]	60.91935	86.04720	55.82063	108.38463	97.45523	76.73200	75.56059
##	[34,]	66.81905	95.62756	98.30324	91.30094	99.23599	115.29450	108.46869
##	[35,]	92.69977	76.35223	102.21579	78.43488	99.52282	102.36606	108.76780
##	[36,]	73.20378	83.44964	81.34842	104.30651	128.82945	84.10147	73.56814
##	[37,]	131.16639	70.77900	113.41885	90.35217	86.80814	77.89537	99.49205
##	[38,]	70.66460	76.30897	71.79464	78.65075	102.59521	117.43007	113.22765
##	[39,]	107.11037	92.66248	91.10088	98.42630	105.32282	88.56655	73.72808
##	[40,]	77.55891	81.60421	77.47608	121.55272	99.01312	57.90218	77.94755
##	[41,]	98.16837	96.94735	114.51542	88.14514	77.89460	78.56719	117.43634
##	[42,]	82.58447	83.30302	88.65947	124.12287	82.21369	65.80268	106.03883
##	[43,]	83.48863	77.15056	92.70238	120.19112	103.45466	66.38577	81.04739
##	[44,]	94.75733	108.71264	110.26577	78.24889	70.21250	103.59321	76.82703
##	[45,]	98.30076	93.88019	79.52426	113.15484	65.35541	70.32622	102.98500
##	[46,]	54.64551	78.37206	87.88213	55.98661	114.23223	134.36034	124.99344
##	[47,]	47.06140	106.61690	85.50090	85.21718	78.77802	110.52031	125.78735
##	[48,]	82.31496	98.92180	95.94004	104.52971	74.41029	71.16652	113.15082
##	[49,]	88.74547	68.31029	79.43176	75.56365	88.48059	81.33873	91.22523
##	[50,]	51.29257	98.16054	67.62866	101.20222	107.31102	68.15424	79.62711

##	[51,]	50.54761	120.30048	78.73564	64.82978	79.76210	102.22764	123.75269
##	[52,]	97.10054	97.09476	72.63518	109.21085	60.12031	42.30452	93.39062
##	[53,]	112.60143	59.82047	89.56306	109.49948	99.02448	50.83009	72.18199
##	[54,]	97.36928	94.15134	77.62005	86.99960	61.02669	101.54313	102.18120
##	[55,]	118.38160	68.80116	96.10488	79.10735	117.43683	105.18476	58.72405
##	[56,]	69.55370	102.57781	104.34185	80.37063	98.29760	95.60444	76.42440
##	[57,]	100.32181	77.66387	100.10793	82.18134	79.88013	77.78282	99.12254
##	[58,]	128.26467	89.47661	85.71594	99.57713	86.61548	79.94556	57.03010
##	[59,]	81.28525	112.15572	93.91805	76.66434	69.65673	100.52589	111.31490
##	[60,]	57.41490	104.36906	59.05136	85.76222	82.88048	85.33643	96.38407
##	[61,]	79.39283	67.88953	56.22756	116.69002	99.89238	67.83957	64.79397
##	[62,]	120.70898	63.84633	113.31137	71.70612	103.01900	106.31914	108.59007
##	[63,]	81.79348	107.74999	70.49442	76.20871	76.05431	94.79361	75.52723
##	[64,]	87.94353	105.89253	68.04345	98.56424	76.75680	80.10591	79.22242
##	[65,]	NA	104.11078	58.07067	82.83686	90.68870	95.82677	110.90027
##	[66,]	NA	NA	90.71900	99.22678	131.06604	89.82989	87.18262
##	[67,]	NA	NA	NA	114.41820	77.71203	66.14913	91.41171
##	[68,]	NA	NA	NA	NA	95.50107	132.57033	105.00197
##	[69,]	NA	NA	NA	NA	NA	77.77734	103.34004
##	[70,]	NA	NA	NA	NA	NA	NA	73.92566
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,72]	[,73]	[,74]	[,75]	[,76]	[,77]	[,78]
##	[1,]	110.41418	60.68545	114.08593	102.99906	125.18155	106.55911	65.86617
##	[2,]	82.49636	92.83018	90.54822	107.88690	79.03979	37.21738	68.29867
##	[3,]	79.36427	80.76970	65.31174	108.21367	52.34699	64.27151	101.11633

##	[4,]	102.35784	91.78837	75.13896	95.84570	96.60974	84.87289	70.58544
##	[5,]	98.24763	89.45079	77.78294	116.29629	81.63898	95.15731	50.91598
##	[6,]	66.65454	117.40959	78.14549	72.13430	86.44351	123.81666	84.77727
##	[7,]	91.14029	109.57029	101.10078	41.45110	78.03909	115.40019	119.10873
##	[8,]	73.55649	104.33887	107.23002	59.79177	81.54172	94.48771	114.15524
##	[9,]	96.91439	71.32960	113.74678	97.95937	110.17122	95.85523	88.94138
##	[10,]	86.81011	104.45759	77.21546	89.59721	74.36205	63.93833	104.51405
##	[11,]	82.85078	91.63705	86.71319	106.28247	110.80631	66.42657	105.88195
##	[12,]	84.26637	100.83688	107.48985	101.60325	112.85299	79.36116	54.96403
##	[13,]	101.07644	71.95446	78.57088	118.34973	80.38259	60.50154	104.26983
##	[14,]	78.58909	98.74077	70.72554	95.13447	87.78772	91.67723	67.73696
##	[15,]	81.21817	95.96508	52.03759	115.37087	85.49759	86.63875	89.03870
##	[16,]	87.89149	99.81596	50.39869	92.19028	88.41998	132.33209	85.17367
##	[17,]	129.08871	57.68704	94.92275	138.99422	89.01894	92.96377	82.57338
##	[18,]	91.59899	66.72898	102.65257	93.98023	110.27611	97.75175	135.92259
##	[19,]	122.79687	69.14880	64.84162	109.63306	87.59473	119.80632	94.63159
##	[20,]	99.13709	100.69152	99.29480	94.88508	91.84055	98.31511	66.28887
##	[21,]	65.43285	100.63444	65.00541	85.91967	52.55611	104.74183	94.74891
##	[22,]	95.06874	94.56683	83.46098	99.06132	107.88301	49.21691	105.88748
##	[23,]	62.51696	129.47188	90.30423	76.17016	71.33717	74.68312	52.45597
##	[24,]	103.43603	99.00548	87.05428	98.77818	116.24451	114.15053	65.16388
##	[25,]	59.44339	82.28069	71.91413	72.24782	71.29017	108.47765	122.13185
##	[26,]	73.80625	73.23859	39.22980	115.08970	79.22119	66.85352	95.04456
##	[27,]	89.27266	76.17605	141.19658	75.36321	103.42340	85.40069	97.76331
##	[28,]	88.26107	109.43697	77.30935	77.58595	43.05724	89.99810	110.94414
##	[29,]	111.85333	67.41713	69.11324	111.52906	108.16514	89.38037	58.81503
##	[30,]	97.17014	114.41962	105.72063	83.46404	60.08237	96.55902	84.18097
##	[31,]	103.93096	65.77326	65.24749	131.33948	99.87501	75.06413	67.84167
##	[32,]	87.92270	84.77658	122.71466	73.21830	105.88894	83.32173	97.53801
##	[33,]	82.26079	87.26276	56.80121	79.87690	85.99193	75.01669	87.61577
##	[34,]	107.35061	105.17932	89.22742	76.54203	124.05094	93.91500	79.94949
##	[35,]	100.21051	41.61263	73.40187	119.56875	125.26644	91.17271	107.44412
##	[36,]	72.84574	109.92259	57.50431	88.64999	88.35864	58.38807	89.10762
##	[37,]	103.42912	81.76529	128.55870	90.09757	80.96478	102.89990	126.03115
##	[38,]	95.15084	84.41908	68.73388	90.84771	124.82906	101.71980	99.45294
##	[39,]	93.67566	111.19325	56.63983	87.85801	75.34588	90.47606	113.06949
##	[40,]	72.81718	75.33065	61.93662	107.59058	87.53573	50.73342	82.68499
##	[41,]	89.74583	90.10958	115.56506	74.57936	98.54623	91.38228	116.78768
##	[42,]	86.94043	92.06704	104.67565	85.90860	101.95658	82.63030	85.22293
##	[43,]	80.37627	96.91218	87.65384	104.12036	83.92255	33.47400	71.50393
##	[44,]	108.71829	79.03875	92.27333	112.46110	81.42669	71.58052	51.95669
##	[45,]	87.34592	63.90694	73.23593	107.33780	103.69942	113.31849	96.44735
##	[46,]	88.69337	90.99304	94.43376	80.88616	138.44560	89.51018	90.51675
##	[47,]	86.99938	84.83477	82.73562	88.95012	142.41712	92.26031	63.56878
##	[48,]	79.66141	112.59392	116.21836	65.65275	92.53629	81.35838	93.01818
##	[49,]	86.05949	60.12331	120.71942	82.06190	82.84724	96.92636	104.82250
##	[50,]	51.44782	100.45750	72.48820	66.66207	86.94275	71.00768	87.39665
##	[51,]	62.72724	104.83947	78.45850	57.26898	113.34895	96.05448	99.09377
##	[52,]	69.24023	91.33051	99.74418	67.60108	65.18019	98.25848	114.29006
##	[53,]	88.29413	69.79914	109.74185	91.79138	63.76634	81.69238	115.73871
##	[54,]	94.95678	60.45552	73.57907	128.27199	107.29133	114.62545	70.25655
##	[55,]	115.28880	93.67031	87.90251	91.43968	66.11886	98.90116	110.29184
##	[56,]	91.09353	104.12306	120.01598	64.57490	82.34215	77.09581	67.00523
##	[57,]	92.51803	38.00346	109.24375	104.85408	95.62446	92.16384	104.28070

##	[58,]	94.64919	90.22550	65.40798	112.34151	55.40659	97.63962	95.54975
##	[59,]	96.25440	101.37793	97.66785	60.95563	99.17465	109.58673	102.20779
##	[60,]	58.92096	82.78494	43.85363	93.29232	98.14314	73.86335	83.96542
##	[61,]	86.67248	93.83712	97.84823	73.26128	69.05709	92.03719	84.34076
##	[62,]	102.79345	87.77976	126.42386	97.99279	99.27149	105.94869	113.38468
##	[63,]	74.61346	99.77891	98.16043	77.22537	73.10823	114.81822	67.70590
##	[64,]	64.54725	127.10418	90.65654	79.63610	66.83109	97.75460	67.52426
##	[65,]	56.05795	107.49503	83.79638	58.89480	112.70908	80.26827	69.92021
##	[66,]	107.64975	78.27487	108.04244	103.91595	91.66246	70.41796	108.96066
##	[67,]	52.62387	109.87593	68.62022	70.41262	82.00707	93.39632	80.22570
##	[68,]	96.77068	73.14714	110.59691	81.81304	106.65969	100.47844	99.21808
##	[69,]	80.13355	84.90984	82.52979	94.35932	87.04044	112.53027	70.56061
##	[70,]	57.85248	97.14865	79.86699	80.81144	52.41791	71.89564	104.49829
##	[71,]	104.17395	89.07393	78.74340	93.86721	37.28933	80.95513	85.72853
##	[72,]	NA	113.28137	78.45695	60.08250	84.20604	79.81821	95.54452
##	[73,]	NA	NA	89.49360	127.54996	99.46631	88.49680	97.49144
##	[74,]	NA	NA	NA	106.58692	89.67878	87.33002	83.00755
##	[75,]	NA	NA	NA	NA	79.03248	97.79442	104.23281
##	[76,]	NA	NA	NA	NA	NA	80.30609	99.30865
##	[77,]	NA	NA	NA	NA	NA	NA	88.76164
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,79]	[,80]	[,81]	[,82]	[,83]	[,84]	[,85]
##	[1,]	112.78636	90.13496	124.25554	85.12431	94.95979	112.93388	97.54438
##	[2,]	90.74477	50.07845	80.75850	84.63440	75.05193	85.97629	85.02734
##	[3,]	73.01201	68.14990	62.02095	64.74728	97.02559	63.98014	112.51426
##	[4,]	107.41239	75.90009	92.50272	120.62137	92.10283	97.45704	98.66752
##	[5,]	61.03987	76.88850	115.66502	90.94790	60.05157	55.33888	85.47923
##	[6,]	78.25788	89.33371	72.07398	101.40812	82.59217	95.62155	84.94075
##	[7,]	95.24226	130.92499	85.24856	102.38088	97.90514	97.28396	76.05378
##	[8,]	112.50267	103.97681	83.54179	85.49527	70.35552	119.65060	64.90281
##	[9,]	96.50384	82.39350	95.59281	47.78878	111.80924	111.38781	97.56089
##	[10,]	54.17689	94.75370	79.80004	87.71225	91.27463	41.71303	84.59024

##	[11,]	82.48706	77.14466	89.49917	59.04462	83.89636	87.71702	80.19561
##	[12,]	79.35608	68.95471	105.96569	83.18791	66.02912	91.43236	66.84462
##	[13,]	60.66943	84.03441	83.45750	61.64257	116.08820	54.39568	108.52858
##	[14,]	85.10663	45.94594	77.16585	63.26004	83.82508	80.42255	104.72324
##	[15,]	74.17734	64.51460	79.78965	78.59818	78.96603	78.26408	96.64039
##	[16,]	79.67331	89.62108	103.47453	90.01613	60.10059	68.73243	93.85954
##	[17,]	79.23043	94.42482	137.44916	63.62555	83.76963	86.77929	85.34420
##	[18,]	100.12533	129.61396	101.49037	83.58133	97.01189	106.62464	85.72401
##	[19,]	80.37440	94.44184	106.11433	69.48608	113.52025	74.36918	118.38858
##	[20,]	53.24758	87.35168	106.46133	74.74626	86.81673	64.56707	78.07891
##	[21,]	69.69727	89.33794	68.04483	93.38388	74.58357	70.43616	95.96891
##	[22,]	88.34824	84.04027	85.84169	89.97424	99.04332	81.55056	85.25617
##	[23,]	78.14663	56.33672	70.52479	101.94148	59.91397	83.04438	70.95922
##	[24,]	100.00805	81.96298	119.67286	97.45920	67.78397	110.47841	73.47574
##	[25,]	105.56506	103.46112	60.32943	96.91787	88.92294	94.95294	111.76044
##	[26,]	98.21591	60.96038	71.09197	90.86708	78.03513	67.72429	124.48765
##	[27,]	99.69724	110.15989	87.26586	86.76504	118.77465	113.59532	87.42401
##	[28,]	84.08248	95.81821	78.15209	84.42392	76.85597	87.56548	75.00784
##	[29,]	109.64487	72.82165	107.36447	115.40727	94.95958	82.01430	121.51043
##	[30,]	59.31885	86.93144	75.99686	71.67922	110.77063	99.69951	71.52790
##	[31,]	87.91975	44.71049	90.95458	63.24769	106.36302	74.90461	127.93215
##	[32,]	129.87373	102.79512	86.15779	111.78423	101.07447	143.65521	80.93842
##	[33,]	111.52178	68.51444	73.36227	101.35400	88.62578	65.57718	124.58989
##	[34,]	109.39843	90.92466	111.31114	109.76355	83.61960	96.43790	78.66237
##	[35,]	103.79489	96.64188	109.09748	78.18600	98.36891	78.60538	123.43787
##	[36,]	76.47082	79.66052	79.80664	117.12873	64.43048	41.38791	88.55777
##	[37,]	82.66502	125.43538	100.74251	54.37841	104.74587	123.14353	62.71141
##	[38,]	90.40406	88.82852	91.46212	82.39209	109.33700	74.40778	114.34954
##	[39,]	66.53012	98.24682	83.01512	92.64598	88.14653	62.35472	84.68000
##	[40,]	103.90484	60.43238	83.33020	95.81786	62.19770	62.41850	111.01481
##	[41,]	120.45870	108.43130	91.38150	87.51911	90.82676	141.03056	69.31775
##	[42,]	114.24852	82.02709	103.51587	82.17261	63.48176	111.26494	71.67659
##	[43,]	89.20827	60.25502	85.90724	97.05339	64.75773	76.70388	79.24729
##	[44,]	94.38518	63.45822	93.05528	100.67491	101.64346	95.34941	101.43236
##	[45,]	106.19134	85.59323	107.15138	64.67148	70.14921	92.91888	106.42464
##	[46,]	95.49366	95.17623	90.29714	103.77126	109.41954	88.58048	98.23641
##	[47,]	128.12247	68.52376	102.51453	109.33043	77.23378	101.18279	103.62542
##	[48,]	115.83192	87.01471	82.70311	93.61639	77.78606	136.77624	58.08890
##	[49,]	102.84126	106.14883	81.31887	71.70073	117.09559	108.38777	106.78502
##	[50,]	110.54838	81.79191	69.96691	129.14684	56.24722	71.13520	97.89327
##	[51,]	123.92923	86.25483	61.96081	120.51733	93.96720	109.55486	102.29449
##	[52,]	113.59996	92.53774	65.77488	73.02433	87.61509	123.95400	88.29169
##	[53,]	90.06025	107.94373	89.60081	65.10752	90.26960	93.46760	86.34979
##	[54,]	80.20871	70.48628	104.22005	60.58736	93.26685	81.77568	119.55152
##	[55,]	48.65883	117.87442	93.27040	78.96913	119.27897	63.72356	87.03794
##	[56,]	108.20266	95.43513	92.28461	131.93828	81.51003	105.61908	70.33719
##	[57,]	113.88297	100.90161	98.19087	69.84421	101.57651	110.11949	110.26540
##	[58,]	45.37061	89.09837	86.07785	69.97126	91.25420	58.49340	94.81257
##	[59,]	120.02899	99.45251	83.89183	97.98811	106.44024	128.50248	87.19242
##	[60,]	106.47692	54.36487	56.50289	105.06958	88.24845	68.67915	138.92867
##	[61,]	88.55828	90.11212	87.54647	82.39570	84.02054	78.27328	90.45650
##	[62,]	57.69150	125.95099	106.09674	59.88249	108.65242	104.71720	60.06809
##	[63,]	75.82763	90.52495	80.59644	99.45495	86.13838	88.67135	89.89201
##	[64,]	59.76306	76.05172	71.97650	93.98838	69.82550	84.95458	68.22159

##	[65,]	120.90918	66.90125	65.47191	126.15119	79.26753	93.81789	102.37103
##	[66,]	64.37450	102.98190	99.58361	55.72462	112.14620	73.98045	83.48899
##	[67,]	91.35276	59.89669	56.56905	85.01097	77.56057	78.21731	104.97081
##	[68,]	100.62328	115.69436	87.26482	108.87935	128.19976	108.67158	102.50389
##	[69,]	111.25867	63.23228	82.23243	80.32868	83.12625	119.92874	103.86647
##	[70,]	98.48610	75.80045	60.56648	80.51943	65.75904	90.72517	88.71675
##	[71,]	71.85192	94.91875	91.22991	97.84065	86.65273	57.29329	93.47222
##	[72,]	105.28664	72.31556	38.86422	108.10235	65.33607	95.79240	92.51169
##	[73,]	105.41142	94.49012	107.46903	71.23291	115.54885	89.69068	131.97113
##	[74,]	88.78554	60.54118	82.75533	96.47511	67.50385	49.09161	120.49496
##	[75,]	109.43068	106.81815	58.39474	120.58603	86.95388	112.48776	72.32303
##	[76,]	77.33042	93.22675	66.24022	88.75412	90.88051	82.48279	86.01013
##	[77,]	95.63090	66.96544	68.38064	99.99596	91.20986	77.70287	95.51219
##	[78,]	88.82590	48.95181	103.57824	102.50807	71.46439	82.05038	93.10560
##	[79,]	NA	98.46763	104.63604	65.36552	90.04066	57.93633	66.05332
##	[80,]	NA	NA	73.23556	89.26533	73.01930	79.73692	111.57897
##	[81,]	NA	NA	NA	103.21620	95.98571	98.18511	103.45446
##	[82,]	NA	NA	NA	NA	106.78266	91.48531	90.40385
##	[83,]	NA	NA	NA	NA	NA	76.19678	70.54998
##	[84,]	NA	NA	NA	NA	NA	NA	103.09140
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,86]	[,87]	[,88]	[,89]	[,90]	[,91]	[,92]
##	[1,]	87.55629	117.30465	65.27000	59.49894	65.49559	91.27943	106.23791
##	[2,]	78.12841	77.97323	114.69685	84.17390	69.00798	104.86763	61.26024
##	[3,]	75.25660	88.63362	127.41933	90.87544	89.27728	108.73543	81.15022
##	[4,]	88.65919	100.66546	95.52494	73.71937	94.65139	73.62849	110.54857
##	[5,]	100.98971	75.19209	96.53697	91.59301	82.43354	61.26896	72.15026
##	[6,]	74.89693	81.73531	79.75560	94.26199	98.77007	59.49791	100.51878
##	[7,]	125.06252	81.96024	93.98982	118.40146	128.35023	82.54586	96.07367
##	[8,]	86.05113	71.61896	99.04261	109.75441	108.33039	104.57209	74.84485
##	[9,]	76.38275	111.82220	79.61335	60.05493	52.99445	126.29798	86.83269
##	[10,]	117.79950	72.20038	100.17386	114.98552	93.03965	99.21775	63.26735
##	[11,]	71.09448	85.02255	80.75776	80.42239	57.95111	143.68152	56.64087
##	[12,]	84.88301	77.08149	73.11087	80.78008	50.54373	91.91007	57.01739
##	[13,]	93.43890	95.61385	99.29718	87.44951	75.75933	116.79732	78.81108
##	[14,]	81.72317	103.42443	114.14893	56.83694	53.31407	117.52463	74.63269
##	[15,]	56.82544	84.05207	98.91361	77.55875	81.75609	95.32595	82.51356
##	[16,]	93.85478	88.79328	96.28287	85.44529	98.06269	79.20020	89.99655
##	[17,]	84.78428	82.57562	94.40775	83.14087	88.28742	89.03197	77.70270

##	[18,]	72.46488	91.64320	51.40618	103.79932	103.48964	100.45135	102.91770
##	[19,]	98.88706	114.92444	102.09763	66.01555	92.11305	96.43437	108.76776
##	[20,]	116.55596	80.14633	87.15786	90.40654	69.08885	84.06457	63.02024
##	[21,]	78.22912	73.46583	105.90402	111.30022	115.30643	61.20273	94.17109
##	[22,]	92.45798	89.39350	84.49132	87.11503	75.26837	124.82379	73.63088
##	[23,]	92.28074	64.23608	111.06632	97.81808	79.48791	73.01720	60.53049
##	[24,]	80.91059	87.47519	78.36802	69.50455	80.90816	78.68311	87.31119
##	[25,]	67.27119	98.86087	91.38711	103.65464	120.64421	82.99859	123.08804
##	[26,]	61.59672	103.98393	109.18995	77.37194	87.16020	105.64394	100.63413
##	[27,]	93.33404	99.89938	61.84110	95.73566	82.74086	92.62166	101.07984
##	[28,]	95.94951	59.77991	137.33004	116.04853	128.64580	88.92048	71.54228
##	[29,]	95.41240	125.02826	88.64200	56.44289	80.13759	78.41207	123.41100
##	[30,]	90.60700	65.60738	111.08659	97.88770	96.89948	74.35802	73.44439
##	[31,]	74.60997	124.33809	104.47870	34.60467	44.79813	121.84895	93.38333
##	[32,]	75.38365	95.07678	69.65593	92.25707	100.01497	84.10072	111.96046
##	[33,]	110.27602	120.72437	118.44514	72.87301	82.93382	117.31850	100.87746
##	[34,]	119.27444	100.00360	82.37869	74.67249	79.92651	102.85285	86.04371
##	[35,]	77.78559	128.89496	61.83208	66.36451	71.90735	120.77562	112.63467
##	[36,]	109.38850	78.09601	94.67195	107.01291	90.04568	91.60852	72.63771
##	[37,]	76.37932	66.91780	82.97893	110.32187	108.31879	96.52747	77.05857
##	[38,]	99.21348	126.69805	70.94083	61.27955	64.14872	122.49944	103.06397
##	[39,]	103.86873	73.87780	105.34229	105.77182	110.68913	92.64273	78.39240
##	[40,]	83.59673	99.68582	106.44619	83.20240	75.53837	112.71165	82.99257
##	[41,]	73.52692	82.40507	81.95029	97.37390	104.29898	103.99165	90.55818
##	[42,]	86.21900	84.05878	94.44082	84.43060	77.94381	113.65371	67.75989
##	[43,]	87.89048	72.44536	106.30810	94.73498	74.93688	99.55968	58.49040
##	[44,]	84.59358	97.09762	106.68809	70.85902	82.95661	70.04090	101.03189
##	[45,]	67.27889	108.67158	86.55504	68.23584	78.00099	114.47752	94.97812
##	[46,]	100.12839	116.38078	46.30482	74.34394	64.09974	102.76815	104.72919
##	[47,]	88.01652	125.83659	68.69947	49.61188	55.13447	105.98764	105.24698
##	[48,]	79.83994	72.17526	95.58461	95.48839	93.15741	100.23229	73.11388
##	[49,]	82.47138	108.08200	83.03964	91.66418	92.19376	95.88976	111.32894
##	[50,]	99.91468	92.13152	93.15098	105.88509	96.75975	86.94720	94.38230
##	[51,]	79.48325	113.52289	72.16347	78.75479	88.80140	96.69156	120.16202
##	[52,]	66.78487	85.41639	112.29781	97.60080	108.21271	104.22906	92.24940
##	[53,]	86.42260	77.55407	103.06107	113.43852	106.65889	100.79938	79.78666
##	[54,]	61.42169	117.74012	75.96626	49.69268	56.00393	94.64269	103.57872
##	[55,]	120.25814	77.01946	100.05430	111.43694	113.78700	78.65077	85.63589
##	[56,]	115.66172	76.83242	94.75214	109.01517	106.96805	56.68022	91.87742
##	[57,]	65.89575	112.04530	77.24806	81.78061	87.21140	103.65505	112.04380
##	[58,]	84.26951	71.94755	110.20407	101.68461	103.89020	75.04179	80.46100
##	[59,]	92.53988	102.61057	92.08396	79.20930	101.40181	98.01767	108.09742
##	[60,]	71.89099	127.23425	92.34037	64.38273	69.72081	106.61001	116.05752
##	[61,]	117.07391	87.95338	114.36207	98.63726	92.82187	94.24461	77.98994
##	[62,]	80.25355	66.64238	54.41120	108.43988	91.70299	85.32361	74.72438
##	[63,]	89.60561	83.15000	86.94982	99.93090	97.70426	43.86871	100.73301
##	[64,]	81.58219	56.21146	97.27957	107.21220	92.57731	54.38810	69.85853
##	[65,]	94.29914	113.51901	79.51589	75.29556	69.31119	95.28016	104.64076
##	[66,]	105.38000	84.45596	86.03417	97.31900	76.23246	119.89526	64.29714
##	[67,]	85.12185	100.32368	106.96600	78.06194	71.77958	105.42532	85.27321
##	[68,]	87.85961	110.54636	53.39838	90.53842	99.25237	69.38499	134.95944
##	[69,]	51.25800	104.26683	101.79716	59.79854	81.42696	86.38617	106.64892
##	[70,]	71.15120	72.57892	126.47113	107.07835	103.91725	103.40634	73.88714
##	[71,]	120.88790	72.79061	134.49855	115.06672	123.50099	65.09335	84.52867

##	[72,]	62.42806	85.94666	87.30073	101.12012	89.24148	91.34348	92.86563
##	[73,]	75.19030	129.31191	81.68675	66.12614	81.84285	104.76025	123.02739
##	[74,]	84.99907	106.44241	107.17720	70.97321	80.84087	102.19361	94.65850
##	[75,]	105.16917	78.83365	91.85233	117.95977	117.30623	77.49231	96.35917
##	[76,]	96.89887	62.90005	140.64907	123.07356	130.43934	70.01820	82.62891
##	[77,]	88.52417	86.78042	106.57034	95.00013	81.12520	107.81444	77.81141
##	[78,]	95.29082	96.57274	97.97125	61.20652	60.00305	72.07314	84.25363
##	[79,]	102.83127	55.15846	89.97924	107.71173	88.38108	77.81783	51.88052
##	[80,]	69.36882	106.46746	111.78082	50.91191	49.11540	106.34020	83.65984
##	[81,]	70.00981	92.34499	105.83598	100.06020	97.99841	95.27119	101.92855
##	[82,]	71.58945	89.26380	93.03265	74.83825	70.07176	120.34431	70.08551
##	[83,]	87.13096	66.63665	95.48178	99.09690	88.76177	80.67186	64.17619
##	[84,]	113.75072	88.02034	102.54190	92.74455	84.04853	91.30723	75.26196
##	[85,]	104.00531	28.96687	82.99836	126.52157	104.40768	72.42507	44.01353
##	[86,]	NA	99.93003	78.23057	72.12936	72.95433	103.13016	101.05331
##	[87,]	NA	NA	99.20814	140.04524	115.65004	65.96547	42.03950
##	[88,]	NA	NA	NA	86.59653	73.94763	88.28853	101.48257
##	[89,]	NA	NA	NA	NA	39.02244	117.69352	106.84157
##	[90,]	NA	NA	NA	NA	NA	121.85920	80.50807
##	[91,]	NA	NA	NA	NA	NA	NA	97.92658
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,93]	[,94]	[,95]	[,96]	[,97]	[,98]	[,99]
##	[1,]	74.10660	105.48932	45.69325	75.24901	114.81986	106.25030	105.51880
##	[2,]	86.92835	58.23375	88.60820	78.45310	90.19446	99.25227	94.46381
##	[3,]	95.85172	57.43475	97.69407	67.63838	96.23143	85.59857	98.42304
##	[4,]	85.29711	101.71365	73.34972	83.54354	85.34160	103.83357	69.01372
##	[5,]	70.58725	76.83118	101.00191	100.77204	111.35792	96.99153	112.09838
##	[6,]	123.27274	99.53267	114.19866	101.55555	104.25807	65.85917	60.47265
##	[7,]	87.50638	110.26568	109.09747	115.59971	51.96485	76.65562	70.24752
##	[8,]	109.77944	74.41162	100.15821	94.17830	54.00989	70.64658	76.36109
##	[9,]	89.42712	81.57716	64.02680	59.38432	118.02114	93.50756	94.82344
##	[10,]	70.58589	84.85067	124.16249	116.30023	76.16867	86.30297	102.86151
##	[11,]	95.11774	60.13059	92.95175	79.17211	92.03911	82.40723	96.59002
##	[12,]	85.27716	78.49689	94.24592	98.71113	111.81993	91.82364	98.91146
##	[13,]	73.48504	75.92620	90.82504	76.31229	101.73952	104.59535	116.87237
##	[14,]	84.95114	64.08211	88.52506	71.12487	115.81495	65.56988	67.34951
##	[15,]	111.60704	59.98368	98.66070	70.53397	104.29261	81.99531	78.98786
##	[16,]	87.79568	80.52167	103.47865	97.16715	94.38300	61.70966	77.41765
##	[17,]	77.88469	58.72955	70.42230	60.69320	100.21530	128.16865	126.63054
##	[18,]	108.01164	100.03082	80.78551	88.42493	79.39310	94.78043	118.48050
##	[19,]	71.91750	86.32591	72.34982	62.66140	104.98195	98.23984	87.22808
##	[20,]	65.68643	86.46589	107.00618	105.59966	112.04672	92.57896	100.36921
##	[21,]	114.72553	81.10949	120.19644	97.94164	94.66529	68.86520	87.76328
##	[22,]	79.50832	85.00917	90.27583	91.52450	73.34917	98.07266	90.33241
##	[23,]	95.89672	75.69322	119.95750	109.40497	93.73553	73.73336	68.88190
##	[24,]	93.65755	83.30898	79.38228	83.03398	96.20977	93.97726	70.35964

##	[25,]	122.80370	100.44097	94.53150	89.82040	82.82700	59.18769	87.00049
##	[26,]	95.92978	72.73081	81.14055	72.34534	93.18885	75.80848	96.33244
##	[27,]	91.16472	119.07097	76.96255	94.84181	97.05153	103.10849	108.77796
##	[28,]	102.38639	55.21617	115.99911	86.00393	52.03314	83.33300	70.58535
##	[29,]	61.42506	112.31124	51.86748	80.53591	103.70711	105.64517	90.93299
##	[30,]	108.47854	70.80778	112.45191	76.69873	98.13838	105.72209	65.31159
##	[31,]	71.67818	71.72199	57.90167	46.98512	128.37595	98.20990	91.41009
##	[32,]	109.59479	112.90071	68.72263	86.63726	74.17373	103.83418	83.28284
##	[33,]	57.42251	97.81233	78.93919	94.25822	77.39461	64.06068	76.02114
##	[34,]	60.03981	105.04784	80.09169	104.87060	69.74850	87.94661	65.32806
##	[35,]	74.30421	101.26580	53.84736	75.88196	104.43175	89.63730	126.24460
##	[36,]	70.52744	93.92210	118.06864	130.66278	70.87397	71.72517	94.48774
##	[37,]	117.99980	68.06840	93.13667	69.19726	80.22603	110.80805	102.85005
##	[38,]	69.29973	109.54664	77.89634	90.59937	103.49559	72.74538	81.80798
##	[39,]	88.43548	78.56025	119.57893	100.56564	66.99336	81.76469	74.36550
##	[40,]	72.77714	76.82801	81.35728	91.98254	85.20369	74.61788	110.43811
##	[41,]	115.12628	84.13212	79.97868	78.25578	62.04848	94.13402	79.75646
##	[42,]	87.36068	69.66606	80.39655	85.69659	75.13563	83.02111	87.72941
##	[43,]	80.36905	67.57462	96.20840	96.21877	80.44444	95.77836	101.02257
##	[44,]	82.21916	88.35542	67.45362	67.55709	105.83394	125.24571	87.89819
##	[45,]	92.88937	71.29881	68.43744	67.54857	103.03885	69.86232	102.50987
##	[46,]	75.12709	133.92872	80.32056	109.19443	101.05517	83.86157	87.93411
##	[47,]	71.08774	112.52713	57.29263	93.42204	100.13368	74.99856	77.66871
##	[48,]	111.54820	76.47720	92.18162	87.13217	63.47372	86.67755	61.67624
##	[49,]	97.40218	103.54501	70.79435	76.01100	102.38529	93.82307	112.32447
##	[50,]	81.61297	109.36101	102.08209	131.43448	68.53059	52.60307	92.08806
##	[51,]	105.47848	124.88151	84.62554	102.76051	81.10538	57.70967	52.91578
##	[52,]	124.84278	69.32485	89.92922	69.44213	73.93128	70.95209	72.75202
##	[53,]	96.57234	70.15712	91.00608	80.20894	77.68323	95.86707	122.12885
##	[54,]	91.59275	82.23819	66.03395	59.22393	157.89315	87.85257	106.02776
##	[55,]	77.83757	90.88669	111.66634	94.97547	83.47897	109.19028	96.07762
##	[56,]	79.11871	113.12730	91.71212	116.71932	66.68135	104.24613	84.34580
##	[57,]	97.30836	91.88570	52.74581	62.86427	102.83670	99.65864	128.29891
##	[58,]	99.24211	63.27635	113.45854	79.58249	103.11023	95.04020	99.07342
##	[59,]	99.08682	102.27219	77.66165	80.50229	70.51790	84.97445	45.45198
##	[60,]	88.33911	104.93947	78.60400	89.66270	105.79780	56.15151	81.63350
##	[61,]	70.08308	85.64377	97.93128	100.16223	83.04690	78.23970	92.02801
##	[62,]	112.43627	84.43756	103.39609	86.34029	102.04515	112.88502	112.06487
##	[63,]	103.48845	104.90541	105.49392	103.86375	113.68313	82.19549	87.83845
##	[64,]	116.30160	77.97440	131.61049	106.14336	104.55587	77.19539	73.71051
##	[65,]	83.05863	125.47735	85.68675	117.25468	90.17653	54.06704	64.68236
##	[66,]	71.12198	78.04547	93.56130	86.18450	91.38048	108.93320	120.22783
##	[67,]	94.82181	85.00303	103.83947	96.30088	102.02233	39.84816	63.54408
##	[68,]	97.19743	142.91258	72.10962	93.49043	99.43526	107.66566	98.26117
##	[69,]	117.38580	74.87941	69.81405	54.01206	113.63490	79.00017	65.07557
##	[70,]	112.82426	55.22377	105.83104	83.70341	70.52922	65.50057	85.79638
##	[71,]	68.95290	79.75848	105.29887	97.16483	72.11462	104.62040	101.36037
##	[72,]	126.37342	95.82315	111.52961	110.68936	86.01848	35.88695	71.95067
##	[73,]	76.77719	95.78284	36.14327	52.60806	111.94618	114.03673	134.13747
##	[74,]	77.48651	79.95250	91.23660	89.75898	95.50486	60.43563	82.13587
##	[75,]	107.03875	116.10382	114.39973	124.81313	55.01177	61.46889	53.23534
##	[76,]	101.92425	69.36769	114.25745	87.49824	69.07063	94.75633	86.13978
##	[77,]	81.02897	82.91881	89.15192	91.81178	75.69001	98.88906	100.18895
##	[78,]	69.39382	88.64356	80.12342	89.99460	118.05525	94.64366	79.27758

```

## [79,] 86.57843 66.14969 127.20088 97.48467 103.53724 105.14416 103.66762
## [80,] 85.60883 71.11613 78.60455 73.38443 114.88662 73.46922 71.58084
## [81,] 121.75887 96.83623 104.57683 95.03886 80.77469 58.87318 64.76364
## [82,] 96.99114 48.98137 83.12018 47.23714 116.42021 102.89215 105.38992
## [83,] 93.11584 71.92411 113.91479 115.95039 79.65523 58.74793 82.91058
## [84,] 55.00851 82.77181 106.41511 107.23393 94.04827 84.63210 108.78817
## [85,] 103.52906 74.38899 131.76778 115.32977 66.88083 98.03093 80.46576
## [86,] 137.37225 74.31518 76.07683 58.24561 117.15286 77.21283 91.97939
## [87,] 108.11055 63.32046 145.99896 113.34830 65.31082 96.53391 87.26539
## [88,] 99.14298 120.34889 83.09782 103.69231 108.40064 89.79583 107.97467
## [89,] 73.87886 88.35773 43.02600 53.57778 131.19937 88.24985 82.10773
## [90,] 77.03421 82.34142 68.63111 73.29301 134.67261 84.42991 91.10242
## [91,] 97.91367 107.37886 109.52215 114.07020 87.13494 101.98305 89.35309
## [92,] 87.32527 46.17287 128.51186 101.30954 81.01526 92.15197 87.71530
## [93,]      NA 99.38443 73.27084 97.42527 88.04286 106.65053 103.44752
## [94,]      NA      NA 103.16748 63.00456 93.31094 94.30248 90.13730
## [95,]      NA      NA      NA 50.29732 111.63184 107.90860 103.89551
## [96,]      NA      NA      NA      NA 117.35210 111.31346 95.95925
## [97,]      NA      NA      NA      NA      NA 85.57998 77.51524
## [98,]      NA      NA      NA      NA      NA      NA 62.97335
## [99,]      NA      NA      NA      NA      NA      NA      NA
## [100,]     NA      NA      NA      NA      NA      NA      NA
##      [,100]
## [1,] 41.37340
## [2,] 117.53819
## [3,] 121.66252
## [4,] 100.91451
## [5,] 95.25365
## [6,] 95.16299
## [7,] 84.47505
## [8,] 98.30146
## [9,] 57.64726
## [10,] 106.71911
## [11,] 93.90649
## [12,] 79.80621
## [13,] 97.86763
## [14,] 87.87539
## [15,] 121.29610
## [16,] 91.02834
## [17,] 95.95233
## [18,] 75.75578
## [19,] 81.39240
## [20,] 75.58179
## [21,] 116.03235
## [22,] 100.79698
## [23,] 112.44747
## [24,] 86.92298
## [25,] 93.25503
## [26,] 112.87091
## [27,] 55.24991
## [28,] 141.26434
## [29,] 75.07985
## [30,] 117.65251
## [31,] 84.48028

```

```
## [32,] 82.01545
## [33,] 82.88150
## [34,] 72.50954
## [35,] 54.83681
## [36,] 107.31831
## [37,] 97.56372
## [38,] 54.91510
## [39,] 121.50284
## [40,] 97.20218
## [41,] 93.65894
## [42,] 85.96354
## [43,] 115.74585
## [44,] 103.64640
## [45,] 71.30141
## [46,] 47.35525
## [47,] 50.57218
## [48,] 103.18454
## [49,] 62.00319
## [50,] 87.74946
## [51,] 74.72545
## [52,] 102.79722
## [53,] 96.45217
## [54,] 64.75773
## [55,] 102.95519
## [56,] 91.60708
## [57,] 64.65118
## [58,] 122.30827
## [59,] 83.59224
## [60,] 82.62959
## [61,] 82.78660
## [62,] 84.50027
## [63,] 83.94533
## [64,] 114.45950
## [65,] 65.06410
## [66,] 83.72271
## [67,] 86.06028
## [68,] 62.56155
## [69,] 91.34271
## [70,] 124.35323
## [71,] 120.66618
## [72,] 97.59547
## [73,] 64.47977
## [74,] 100.16772
## [75,] 90.42319
## [76,] 137.05383
## [77,] 113.00002
## [78,] 84.36740
## [79,] 109.30296
## [80,] 98.57995
## [81,] 108.07978
## [82,] 89.13637
## [83,] 105.64172
## [84,] 99.10465
## [85,] 111.16878
```

```
## [86,] 92.61285
## [87,] 133.73024
## [88,] 49.41310
## [89,] 60.95005
## [90,] 64.26975
## [91,] 100.95113
## [92,] 119.04128
## [93,] 72.91321
## [94,] 127.74825
## [95,] 55.51334
## [96,] 89.64537
## [97,] 115.51882
## [98,] 85.71343
## [99,] 101.85334
## [100,] NA
```

```
all_angles(X)
```

```
##      [,1]      [,2]      [,3]      [,4]      [,5]      [,6]      [,7]      [,8]
## [1,] NA 92.96163 126.14924 91.33681 81.41249 108.04412 101.50051 89.30027
## [2,] NA      NA 66.14781 88.90066 78.21263 119.86235 130.65064 85.92698
## [3,] NA      NA      NA 104.77015 86.03254 96.71089 106.26462 98.34278
## [4,] NA      NA      NA      NA 96.51874 77.04727 102.32236 111.46164
## [5,] NA      NA      NA      NA      NA 87.33802 112.38187 112.04775
## [6,] NA      NA      NA      NA      NA      NA 82.00564 103.00972
## [7,] NA      NA      NA      NA      NA      NA      NA 63.86235
## [8,] NA      NA      NA      NA      NA      NA      NA      NA
## [9,] NA      NA      NA      NA      NA      NA      NA      NA
## [10,] NA      NA      NA      NA      NA      NA      NA      NA
## [11,] NA      NA      NA      NA      NA      NA      NA      NA
## [12,] NA      NA      NA      NA      NA      NA      NA      NA
## [13,] NA      NA      NA      NA      NA      NA      NA      NA
## [14,] NA      NA      NA      NA      NA      NA      NA      NA
## [15,] NA      NA      NA      NA      NA      NA      NA      NA
## [16,] NA      NA      NA      NA      NA      NA      NA      NA
## [17,] NA      NA      NA      NA      NA      NA      NA      NA
## [18,] NA      NA      NA      NA      NA      NA      NA      NA
## [19,] NA      NA      NA      NA      NA      NA      NA      NA
## [20,] NA      NA      NA      NA      NA      NA      NA      NA
## [21,] NA      NA      NA      NA      NA      NA      NA      NA
## [22,] NA      NA      NA      NA      NA      NA      NA      NA
## [23,] NA      NA      NA      NA      NA      NA      NA      NA
## [24,] NA      NA      NA      NA      NA      NA      NA      NA
## [25,] NA      NA      NA      NA      NA      NA      NA      NA
## [26,] NA      NA      NA      NA      NA      NA      NA      NA
## [27,] NA      NA      NA      NA      NA      NA      NA      NA
## [28,] NA      NA      NA      NA      NA      NA      NA      NA
## [29,] NA      NA      NA      NA      NA      NA      NA      NA
## [30,] NA      NA      NA      NA      NA      NA      NA      NA
## [31,] NA      NA      NA      NA      NA      NA      NA      NA
## [32,] NA      NA      NA      NA      NA      NA      NA      NA
## [33,] NA      NA      NA      NA      NA      NA      NA      NA
## [34,] NA      NA      NA      NA      NA      NA      NA      NA
## [35,] NA      NA      NA      NA      NA      NA      NA      NA
```

##	[36,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA	NA

##	[90,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA	NA
##		[,9]	[,10]	[,11]	[,12]	[,13]	[,14]	[,15]	
##	[1,]	56.13061	128.16096	96.33568	63.07440	111.33446	90.36160	120.86324	
##	[2,]	83.52186	81.97685	63.51225	57.92624	74.79280	73.44154	80.89861	
##	[3,]	89.44478	61.06160	75.78117	104.52283	43.63118	64.37778	63.78853	
##	[4,]	121.31606	113.90406	110.05262	106.71648	108.73637	107.72862	65.86154	
##	[5,]	103.20692	81.40243	106.03555	62.47102	88.65334	82.98753	88.01526	
##	[6,]	110.09199	101.72663	113.46293	101.75819	111.99458	87.52168	64.08977	
##	[7,]	96.76046	81.47716	108.94075	120.00398	105.15245	100.13227	119.08837	
##	[8,]	78.65815	101.91719	74.07387	88.57199	115.58430	89.14144	106.86387	
##	[9,]	NA	101.56552	64.38433	67.32418	79.48168	58.03272	109.64924	
##	[10,]	NA	NA	73.94297	91.33310	43.11215	85.58022	91.38220	
##	[11,]	NA	NA	NA	67.96847	65.36019	73.63658	75.31200	
##	[12,]	NA	NA	NA	NA	94.96438	74.78611	100.96035	
##	[13,]	NA	NA	NA	NA	NA	77.66984	80.12661	
##	[14,]	NA	NA	NA	NA	NA	NA	80.71216	
##	[15,]	NA	NA	NA	NA	NA	NA	NA	
##	[16,]	NA	NA	NA	NA	NA	NA	NA	
##	[17,]	NA	NA	NA	NA	NA	NA	NA	
##	[18,]	NA	NA	NA	NA	NA	NA	NA	
##	[19,]	NA	NA	NA	NA	NA	NA	NA	
##	[20,]	NA	NA	NA	NA	NA	NA	NA	
##	[21,]	NA	NA	NA	NA	NA	NA	NA	
##	[22,]	NA	NA	NA	NA	NA	NA	NA	
##	[23,]	NA	NA	NA	NA	NA	NA	NA	
##	[24,]	NA	NA	NA	NA	NA	NA	NA	
##	[25,]	NA	NA	NA	NA	NA	NA	NA	
##	[26,]	NA	NA	NA	NA	NA	NA	NA	
##	[27,]	NA	NA	NA	NA	NA	NA	NA	
##	[28,]	NA	NA	NA	NA	NA	NA	NA	
##	[29,]	NA	NA	NA	NA	NA	NA	NA	
##	[30,]	NA	NA	NA	NA	NA	NA	NA	
##	[31,]	NA	NA	NA	NA	NA	NA	NA	
##	[32,]	NA	NA	NA	NA	NA	NA	NA	
##	[33,]	NA	NA	NA	NA	NA	NA	NA	
##	[34,]	NA	NA	NA	NA	NA	NA	NA	
##	[35,]	NA	NA	NA	NA	NA	NA	NA	
##	[36,]	NA	NA	NA	NA	NA	NA	NA	
##	[37,]	NA	NA	NA	NA	NA	NA	NA	
##	[38,]	NA	NA	NA	NA	NA	NA	NA	
##	[39,]	NA	NA	NA	NA	NA	NA	NA	
##	[40,]	NA	NA	NA	NA	NA	NA	NA	
##	[41,]	NA	NA	NA	NA	NA	NA	NA	
##	[42,]	NA	NA	NA	NA	NA	NA	NA	

##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA

##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,16]	[,17]	[,18]	[,19]	[,20]	[,21]	[,22]
##	[1,]	99.23899	67.30492	82.90617	92.21570	79.39312	125.05783	108.08541
##	[2,]	119.92448	75.33580	110.89758	121.58660	88.20434	103.02694	68.95935
##	[3,]	91.65655	88.20636	105.22732	78.42957	89.40283	62.27731	83.43537
##	[4,]	87.78692	88.57858	97.81250	79.00961	125.26780	95.22395	77.55021
##	[5,]	69.08589	63.80883	113.69746	91.27715	53.86534	68.58181	116.78681
##	[6,]	59.05590	116.55986	98.05791	80.46275	93.18601	49.45812	114.07163
##	[7,]	76.12192	115.50133	83.74683	79.05632	88.66779	86.80893	100.80121
##	[8,]	89.93024	90.22122	73.48421	111.68530	104.09557	99.21487	93.50844
##	[9,]	109.40839	84.97061	89.03869	88.28098	70.00873	120.70246	92.37257
##	[10,]	94.86657	104.64493	99.14571	92.98717	63.68926	80.23622	65.72763
##	[11,]	105.00988	84.41584	73.64419	104.88164	90.14323	113.87810	46.78589
##	[12,]	105.21917	78.92081	101.96732	127.50647	56.17662	110.54102	89.11674
##	[13,]	107.22717	86.40273	93.10762	76.58921	73.85462	89.04189	62.69209
##	[14,]	77.85253	100.09185	130.28489	77.90098	64.74042	86.76540	97.87103
##	[15,]	69.59809	84.00053	92.03927	74.69273	112.75018	63.99158	75.87117
##	[16,]	NA	86.87263	95.54301	58.22029	86.58507	56.19922	116.54043
##	[17,]	NA	NA	77.10114	80.04927	90.41232	98.18504	95.55856
##	[18,]	NA	NA	NA	95.14991	117.85776	99.48059	77.18756
##	[19,]	NA	NA	NA	NA	91.01903	79.57438	99.56496
##	[20,]	NA	NA	NA	NA	NA	89.91774	105.70586
##	[21,]	NA	NA	NA	NA	NA	NA	121.01759
##	[22,]	NA	NA	NA	NA	NA	NA	NA
##	[23,]	NA	NA	NA	NA	NA	NA	NA
##	[24,]	NA	NA	NA	NA	NA	NA	NA
##	[25,]	NA	NA	NA	NA	NA	NA	NA
##	[26,]	NA	NA	NA	NA	NA	NA	NA
##	[27,]	NA	NA	NA	NA	NA	NA	NA
##	[28,]	NA	NA	NA	NA	NA	NA	NA
##	[29,]	NA	NA	NA	NA	NA	NA	NA
##	[30,]	NA	NA	NA	NA	NA	NA	NA
##	[31,]	NA	NA	NA	NA	NA	NA	NA
##	[32,]	NA	NA	NA	NA	NA	NA	NA
##	[33,]	NA	NA	NA	NA	NA	NA	NA
##	[34,]	NA	NA	NA	NA	NA	NA	NA
##	[35,]	NA	NA	NA	NA	NA	NA	NA
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA

##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,23]	[,24]	[,25]	[,26]	[,27]	[,28]	[,29]
##	[1,]	100.25705	67.70055	110.63606	115.41352	60.29615	129.80918	69.38425
##	[2,]	56.58168	94.38858	119.70312	72.43670	93.14959	85.63976	93.43687

##	[3,]	81.19470	127.84397	75.57356	50.51787	106.88566	65.31978	104.98930
##	[4,]	96.63428	53.81703	94.64061	72.79703	117.68956	88.46679	38.11183
##	[5,]	62.26077	84.45967	104.73476	88.50339	103.02739	97.24426	79.43648
##	[6,]	78.41951	74.48668	61.99312	90.04270	107.83458	87.24298	90.27612
##	[7,]	102.62902	100.84691	71.64809	118.68839	82.65962	68.23289	108.87186
##	[8,]	88.26391	86.14057	79.34768	101.61840	85.00010	60.54885	126.50741
##	[9,]	94.72397	97.35384	106.74424	111.25408	54.95985	112.16214	107.06247
##	[10,]	79.99174	134.11269	97.82441	84.97386	90.96791	81.95017	111.42663
##	[11,]	92.99933	93.94554	107.46535	79.22036	88.98026	91.30395	115.88409
##	[12,]	55.06839	78.20501	131.66026	109.82328	71.65243	119.42339	99.13826
##	[13,]	97.73261	133.83090	98.93088	71.64233	86.05978	92.53090	99.17914
##	[14,]	62.99942	95.93333	98.29689	84.22118	99.30979	86.90305	100.15477
##	[15,]	89.17770	72.77231	77.54160	44.77588	139.51445	72.36715	82.05380
##	[16,]	92.49796	69.40984	66.00504	77.97050	133.03405	70.95612	83.63739
##	[17,]	104.90472	70.84395	106.84386	83.59955	99.97648	84.98482	79.37230
##	[18,]	137.70469	87.63755	69.77714	87.62084	76.44599	96.33733	99.69062
##	[19,]	121.76878	85.81070	78.09886	79.74947	113.55498	79.70505	68.92968
##	[20,]	63.25713	106.00198	118.46903	121.36944	72.11337	108.57322	105.17561
##	[21,]	75.51375	102.49446	47.29759	66.99733	116.62064	66.14127	99.75926
##	[22,]	102.20831	94.19803	112.44849	75.75817	93.85033	91.38054	89.31110
##	[23,]	NA	92.21940	106.53458	95.90120	94.02175	85.86304	103.16369
##	[24,]	NA	NA	103.39241	94.79664	114.03819	91.79491	64.42892
##	[25,]	NA	NA	NA	65.46848	100.57930	71.68791	98.07257
##	[26,]	NA	NA	NA	NA	128.43073	74.43361	73.61824
##	[27,]	NA	NA	NA	NA	NA	126.66602	105.48205
##	[28,]	NA	NA	NA	NA	NA	NA	110.07348
##	[29,]	NA	NA	NA	NA	NA	NA	NA
##	[30,]	NA	NA	NA	NA	NA	NA	NA
##	[31,]	NA	NA	NA	NA	NA	NA	NA
##	[32,]	NA	NA	NA	NA	NA	NA	NA
##	[33,]	NA	NA	NA	NA	NA	NA	NA
##	[34,]	NA	NA	NA	NA	NA	NA	NA
##	[35,]	NA	NA	NA	NA	NA	NA	NA
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA

##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,30]	[,31]	[,32]	[,33]	[,34]	[,35]	[,36]
##	[1,]	111.20300	82.90801	69.44965	98.55994	73.74304	69.80843	123.31421
##	[2,]	86.97624	67.81577	88.90540	86.29554	97.01883	102.83419	76.47578
##	[3,]	73.78741	61.11909	124.16422	71.83129	130.30815	91.43575	77.23622
##	[4,]	87.21083	79.99520	63.97809	92.12547	68.06450	95.82753	88.09594
##	[5,]	91.79708	86.09856	123.01233	97.89656	106.08676	96.90609	75.73459
##	[6,]	65.81474	102.21706	94.99740	107.60992	102.28214	111.50190	94.61472
##	[7,]	86.30742	128.10554	89.71627	75.91094	71.86395	101.95678	93.23580
##	[8,]	99.44339	120.07128	73.32840	88.09264	79.78982	98.69293	102.60102
##	[9,]	86.52733	66.17885	89.83480	87.98515	89.31050	76.79100	125.13679

##	[10,]	85.85016	90.12900	127.68401	71.22074	98.05038	92.20133	42.33446
##	[11,]	99.13714	72.65607	93.97707	89.34970	83.87892	71.27858	78.83366
##	[12,]	94.42151	85.33907	91.03975	106.46980	85.40955	96.79739	86.78517
##	[13,]	82.02516	58.13278	121.56432	76.19611	111.39958	73.56296	70.54380
##	[14,]	74.28790	51.61875	124.77047	62.26153	92.61950	99.08256	94.85179
##	[15,]	75.82028	66.31905	101.76261	99.59294	104.77570	89.64522	80.20003
##	[16,]	95.60539	94.19660	121.53359	81.43958	87.02279	86.45692	84.60524
##	[17,]	97.86730	79.13705	91.60246	111.89053	97.60390	73.64833	106.58939
##	[18,]	119.12267	112.79795	63.59820	112.81012	91.96623	51.37390	97.64999
##	[19,]	79.77126	63.97731	114.65481	74.97387	87.62390	73.88834	104.84379
##	[20,]	77.51207	85.02831	129.23501	87.87568	94.09814	101.16614	83.60028
##	[21,]	74.30810	100.41447	118.54307	94.59208	133.42876	105.81130	79.96039
##	[22,]	97.86452	76.09975	79.67809	81.69782	67.29487	75.88158	61.94196
##	[23,]	69.25554	91.32567	104.69095	88.22549	98.73822	136.85317	74.42042
##	[24,]	93.15688	90.94807	68.60026	111.47736	59.86905	93.14513	106.55817
##	[25,]	97.96219	106.89757	90.57279	84.65897	117.61132	80.68188	94.08847
##	[26,]	105.07623	63.76215	101.17732	72.06979	108.99222	70.06785	67.72288
##	[27,]	94.07889	101.84378	68.88733	99.69774	94.14984	84.17901	108.63903
##	[28,]	71.37645	102.50021	101.09585	82.15426	95.92216	114.83442	86.77880
##	[29,]	106.23398	66.83940	78.79668	79.06967	70.59688	73.59896	87.97723
##	[30,]	NA	83.66862	99.38767	108.45806	106.68534	138.06811	108.76157
##	[31,]	NA	NA	109.00112	69.98617	92.88793	73.36191	94.07305
##	[32,]	NA	NA	NA	111.03134	73.35039	89.73574	111.47478
##	[33,]	NA	NA	NA	NA	72.38222	79.59246	67.34992
##	[34,]	NA	NA	NA	NA	NA	85.91888	83.54848
##	[35,]	NA	NA	NA	NA	NA	NA	87.15278
##	[36,]	NA	NA	NA	NA	NA	NA	NA
##	[37,]	NA	NA	NA	NA	NA	NA	NA
##	[38,]	NA	NA	NA	NA	NA	NA	NA
##	[39,]	NA	NA	NA	NA	NA	NA	NA
##	[40,]	NA	NA	NA	NA	NA	NA	NA
##	[41,]	NA	NA	NA	NA	NA	NA	NA
##	[42,]	NA	NA	NA	NA	NA	NA	NA
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA

##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,37]	[,38]	[,39]	[,40]	[,41]	[,42]	[,43]
##	[1,]	85.71328	88.87987	144.57788	92.59273	80.57686	64.36607	95.39872
##	[2,]	95.24121	117.68412	104.63905	51.87437	88.97980	63.93323	21.53727
##	[3,]	91.80135	93.46660	72.03985	64.91486	111.24698	104.50312	74.74008
##	[4,]	111.62249	93.47519	75.46330	99.01045	82.70229	104.85690	89.61710
##	[5,]	109.47742	110.22272	99.76969	73.77255	130.78212	93.77550	73.06229
##	[6,]	99.67380	86.46539	73.12182	123.28868	101.82004	123.46690	122.27939
##	[7,]	78.85927	77.21631	72.25480	115.60042	78.64180	92.30996	124.26063
##	[8,]	56.98379	106.74871	97.45724	84.98471	43.07741	40.49518	85.53057
##	[9,]	69.64351	73.17124	125.58974	93.70480	81.23931	65.48702	95.50797
##	[10,]	102.06949	76.27179	60.69051	73.59743	120.86592	107.30294	73.20711
##	[11,]	74.24491	75.53945	85.21667	69.54956	73.06485	63.33064	64.34461
##	[12,]	93.45239	102.22482	126.10754	76.52959	95.71539	60.14290	55.88542
##	[13,]	92.01483	71.61197	73.73840	73.21671	117.19451	110.90948	77.20391
##	[14,]	104.98694	72.89735	95.19287	78.47305	110.56809	79.32763	85.82642
##	[15,]	95.78286	89.28434	56.15991	87.16379	94.26819	109.03981	86.06957
##	[16,]	102.66427	78.37455	64.65204	93.71436	105.14693	98.39613	116.20621

##	[17,]	66.27646	114.32751	101.23857	79.84715	81.61798	72.21405	77.13509
##	[18,]	55.65997	86.00473	89.35034	93.89893	54.73885	83.97119	103.33830
##	[19,]	93.23426	59.96184	64.57310	107.71820	105.81812	116.84852	130.37265
##	[20,]	99.54930	81.70806	103.38605	92.26878	130.29408	91.60713	86.82955
##	[21,]	97.48050	104.62556	68.54565	91.13111	115.97323	122.39491	103.03028
##	[22,]	91.99243	71.09158	66.67011	76.65562	76.23321	86.02728	64.20291
##	[23,]	111.01048	114.94731	101.38539	78.18359	110.81523	81.12458	58.28067
##	[24,]	89.27757	96.60147	92.27987	105.90959	67.99059	73.57213	95.00411
##	[25,]	85.58506	89.41504	76.61391	91.29512	85.59088	108.87110	119.78104
##	[26,]	108.36497	90.22365	68.49941	52.44023	97.72794	100.52228	73.53019
##	[27,]	74.02077	87.95358	133.07769	99.66736	83.28481	82.31744	93.52433
##	[28,]	72.41932	110.53638	54.44918	89.12217	74.80642	84.09999	88.30658
##	[29,]	126.08169	81.33538	92.55742	85.23975	102.57472	104.87149	92.43234
##	[30,]	76.16814	101.40023	77.56684	127.84777	97.91465	111.81740	100.02218
##	[31,]	108.80312	68.30056	91.95951	73.92833	110.80975	96.00644	80.66798
##	[32,]	72.92002	105.89629	111.08454	103.45522	40.64836	74.49085	89.00887
##	[33,]	125.46988	61.58415	79.79624	59.40967	106.82228	85.59215	85.41681
##	[34,]	102.95296	66.03854	83.91517	95.89359	71.94586	68.05109	90.85458
##	[35,]	90.78540	59.37520	94.36683	69.26436	87.48982	87.61961	97.83614
##	[36,]	126.29394	81.51568	61.10748	56.61682	115.03880	99.87810	60.23193
##	[37,]	NA	108.49722	95.64893	112.28426	48.77521	72.55357	100.93593
##	[38,]	NA	NA	72.96590	96.48288	103.58593	105.06194	116.63928
##	[39,]	NA	NA	NA	97.47264	96.34620	117.30680	99.91359
##	[40,]	NA	NA	NA	NA	100.02211	67.72744	44.10508
##	[41,]	NA	NA	NA	NA	NA	54.72310	90.90494
##	[42,]	NA	NA	NA	NA	NA	NA	63.77748
##	[43,]	NA	NA	NA	NA	NA	NA	NA
##	[44,]	NA	NA	NA	NA	NA	NA	NA
##	[45,]	NA	NA	NA	NA	NA	NA	NA
##	[46,]	NA	NA	NA	NA	NA	NA	NA
##	[47,]	NA	NA	NA	NA	NA	NA	NA
##	[48,]	NA	NA	NA	NA	NA	NA	NA
##	[49,]	NA	NA	NA	NA	NA	NA	NA
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA

##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##	[,44]	[,45]	[,46]	[,47]	[,48]	[,49]	[,50]	
##	[1,]	79.94970	67.82696	76.88869	50.70326	83.40976	66.07910	97.60072
##	[2,]	64.04633	97.02177	109.18906	88.88024	69.18843	98.41018	82.02021
##	[3,]	86.73173	87.95100	116.35391	126.05178	108.79968	84.08194	89.97156
##	[4,]	45.97527	109.40123	87.35857	72.43665	83.52017	129.06666	100.71600
##	[5,]	76.20836	85.06165	108.58227	95.64211	117.52682	97.74362	79.85530
##	[6,]	91.75446	98.77601	87.36461	98.18558	99.58540	104.41210	96.55655
##	[7,]	124.90499	95.02283	84.38727	99.53790	84.18162	80.28161	82.27452
##	[8,]	121.77278	66.33279	110.80649	88.99234	41.49042	78.82380	77.69986
##	[9,]	100.12210	68.37332	77.99362	75.68616	79.19326	51.98243	109.60138
##	[10,]	109.00253	112.35631	81.01948	116.60063	114.84122	96.34602	72.92646
##	[11,]	110.65248	75.55826	81.10520	83.87683	72.00391	97.35051	94.67097
##	[12,]	85.58937	87.99353	82.33093	69.41483	76.01413	89.92040	83.80975
##	[13,]	90.95667	100.22430	83.54135	115.47110	121.52762	82.53202	98.18009
##	[14,]	93.49404	73.11192	95.33598	81.84856	90.95522	85.39649	92.28030
##	[15,]	76.49278	86.33650	104.97793	101.53053	96.31916	128.08303	107.11627
##	[16,]	108.48382	60.99460	104.06303	89.32417	109.14930	110.32833	85.44721
##	[17,]	73.17622	65.38974	120.96654	96.51091	91.63197	90.93354	112.86701
##	[18,]	115.96046	70.82055	80.20520	90.69107	85.13719	79.30800	93.78837
##	[19,]	87.50692	76.09456	92.48678	97.04718	121.52802	93.17090	119.53572
##	[20,]	99.56448	95.74703	80.29175	94.78775	111.67978	77.13454	88.29262
##	[21,]	94.85052	88.37919	118.07415	126.50677	116.84555	92.93804	80.09487
##	[22,]	90.05853	108.21818	66.67897	82.69026	77.98054	116.26137	92.73917
##	[23,]	77.84051	107.82704	103.73580	92.53958	78.49757	99.15689	70.11810

##	[24,]	73.37176	77.47813	93.47753	60.01928	66.67854	123.78115	108.29233
##	[25,]	111.06506	71.53118	102.87806	106.41410	102.28119	75.65967	75.48268
##	[26,]	79.35396	75.29109	107.60950	94.24376	104.55200	108.21119	77.74956
##	[27,]	98.13541	99.95196	63.15813	84.14240	85.01800	39.94899	88.11054
##	[28,]	97.64342	86.39805	137.72462	123.94823	73.65721	105.74821	92.37246
##	[29,]	48.90553	93.84906	78.44980	59.16801	107.00714	109.12513	91.97322
##	[30,]	71.73057	120.65111	104.87906	125.36412	85.45377	93.01815	127.65805
##	[31,]	64.18900	81.31433	86.24673	77.96472	106.20277	93.61434	109.62828
##	[32,]	74.86914	99.81996	79.98863	69.91422	50.76349	86.18291	94.85468
##	[33,]	99.44499	82.06571	82.35227	72.85152	100.14270	88.86468	59.72999
##	[34,]	93.79369	92.86254	62.83885	46.46084	67.22579	115.81619	87.46092
##	[35,]	105.69396	55.84683	68.79312	68.82146	111.96016	79.21733	86.25541
##	[36,]	99.32856	107.31721	78.43983	90.53561	106.76480	120.83608	49.77230
##	[37,]	105.78282	77.42828	109.90294	116.38594	65.44348	68.90066	121.80195
##	[38,]	112.94536	83.49815	42.45874	67.79749	111.74863	92.14946	93.49800
##	[39,]	101.44809	103.08223	93.09683	113.72143	102.58156	129.65441	95.64396
##	[40,]	91.10689	70.57506	101.08176	78.06019	94.55140	91.72392	48.78252
##	[41,]	98.71317	77.58870	97.55919	81.07464	34.49286	88.65022	101.24114
##	[42,]	102.16883	60.57163	103.07141	64.88661	43.69462	84.52095	78.62032
##	[43,]	72.64323	99.42869	102.59779	85.90742	73.20439	104.93811	68.17819
##	[44,]	NA	114.18138	101.02094	86.55590	90.10053	102.97273	108.08638
##	[45,]	NA	NA	106.07859	74.11061	89.29221	76.05444	86.36021
##	[46,]	NA	NA	NA	58.40145	100.60683	89.52880	85.32274
##	[47,]	NA	NA	NA	NA	76.27657	97.91725	75.26476
##	[48,]	NA	NA	NA	NA	NA	96.16838	92.99192
##	[49,]	NA	NA	NA	NA	NA	NA	88.36685
##	[50,]	NA	NA	NA	NA	NA	NA	NA
##	[51,]	NA	NA	NA	NA	NA	NA	NA
##	[52,]	NA	NA	NA	NA	NA	NA	NA
##	[53,]	NA	NA	NA	NA	NA	NA	NA
##	[54,]	NA	NA	NA	NA	NA	NA	NA
##	[55,]	NA	NA	NA	NA	NA	NA	NA
##	[56,]	NA	NA	NA	NA	NA	NA	NA
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA

##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,51]	[,52]	[,53]	[,54]	[,55]	[,56]	[,57]
##	[1,]	96.28040	95.39164	86.99857	66.63064	120.46785	73.12799	54.67292
##	[2,]	112.37632	87.71696	77.53000	98.47164	114.62260	76.99140	88.45843
##	[3,]	110.14031	75.82208	68.55210	80.98278	72.38883	119.72577	88.30409
##	[4,]	65.21078	107.99719	136.13056	96.88779	95.32768	76.35538	113.20774
##	[5,]	130.27883	115.77677	87.08733	66.63206	88.81302	80.67996	93.95176
##	[6,]	63.79206	90.16236	122.31089	75.38750	81.19408	100.81737	116.82594
##	[7,]	74.11738	72.90802	83.66941	120.77939	65.55218	81.40370	100.56841
##	[8,]	87.15218	38.00204	57.56048	117.64861	112.78024	81.66636	74.58625
##	[9,]	98.53968	72.90275	71.56352	67.10617	104.20578	103.83007	59.20121
##	[10,]	105.12713	110.10436	80.95603	107.42815	54.04557	99.63418	112.38360
##	[11,]	93.28876	84.39281	79.43656	90.78220	103.65006	118.46806	85.44191
##	[12,]	109.37849	104.69609	87.84449	79.50260	120.99160	73.96507	86.35557
##	[13,]	112.31958	105.54023	76.62094	82.08481	58.24617	119.13549	89.08437
##	[14,]	94.60239	75.81126	91.01140	65.29591	97.90250	111.62920	96.97862
##	[15,]	83.09852	91.99982	112.85740	72.19205	87.04196	126.88217	110.84677
##	[16,]	86.28827	88.09767	102.78056	69.34991	82.24835	112.83959	105.60103
##	[17,]	136.77632	92.61362	68.40192	72.34154	94.36592	93.70575	63.99323
##	[18,]	81.29014	82.80966	73.58482	93.22222	94.60780	104.50650	59.20578
##	[19,]	91.01512	93.88056	102.52774	63.93852	56.64899	123.85491	94.73864
##	[20,]	120.73191	111.20101	83.64561	74.89601	74.54462	86.39070	97.96218
##	[21,]	94.95703	80.91056	86.48846	76.88517	71.49722	105.24522	100.59089
##	[22,]	77.53629	106.89795	102.50827	114.59389	87.20602	99.69375	106.24784
##	[23,]	100.22826	89.84020	93.57617	96.00635	104.16403	66.27503	113.67832
##	[24,]	78.15811	95.39450	121.75323	81.34686	114.94374	83.46065	100.98621
##	[25,]	68.42267	60.48196	79.57137	83.83935	86.25635	109.66034	76.52201
##	[26,]	84.68456	86.48545	92.12690	78.07810	97.23522	117.23983	88.14768
##	[27,]	92.07759	89.35235	69.62767	93.70238	95.73741	70.07328	59.51072
##	[28,]	98.97848	55.41361	73.45391	115.82849	73.92108	96.41631	105.17765
##	[29,]	77.28459	121.67591	126.14904	75.54633	97.45760	78.98402	94.43631
##	[30,]	100.23673	82.35144	98.09095	91.22751	60.75944	92.62728	115.87838

##	[31,]	96.62858	100.38361	102.55877	55.21337	92.31654	117.72814	88.01915
##	[32,]	63.83950	79.87301	96.16768	111.89830	118.00483	61.26729	74.56015
##	[33,]	76.36135	86.09569	90.86261	97.40598	89.87693	93.97646	96.64098
##	[34,]	65.51046	103.86041	118.62269	112.04928	100.79474	73.93412	110.72081
##	[35,]	85.28633	101.13853	83.54916	65.98033	98.01811	118.46198	56.69935
##	[36,]	85.95971	119.46606	100.73710	110.26930	82.15991	88.09880	120.16354
##	[37,]	108.57774	57.19732	54.44271	96.75973	84.36307	99.04431	63.65406
##	[38,]	61.95596	107.16819	114.28506	75.64556	75.94070	122.33311	100.43083
##	[39,]	79.15775	97.66189	108.47703	106.59874	51.26905	115.80962	131.91113
##	[40,]	102.34116	90.20787	70.08335	89.98957	115.63791	90.31911	75.08491
##	[41,]	74.46463	55.45424	78.21309	114.98681	113.97902	82.99175	72.48245
##	[42,]	99.12701	63.79300	65.50475	102.22829	134.06704	75.26945	69.02735
##	[43,]	110.54562	97.95961	78.67205	107.19747	113.81683	70.63546	92.36415
##	[44,]	98.44710	107.45197	110.48290	83.26424	95.29621	68.34262	96.12493
##	[45,]	96.79402	63.88900	67.49555	59.16895	115.49723	117.45720	53.81309
##	[46,]	56.41745	123.29497	120.49325	88.88861	88.64083	91.32598	99.06022
##	[47,]	60.78275	102.25633	116.24623	81.63401	133.42223	78.40675	85.65055
##	[48,]	77.69456	57.26646	84.70625	121.42726	123.40630	68.33201	89.26994
##	[49,]	102.00466	66.00655	48.57311	77.35433	92.15245	87.72813	39.76303
##	[50,]	78.19167	90.72801	81.34086	107.88415	110.55539	69.70654	89.49787
##	[51,]	NA	86.64020	126.93282	100.42987	103.62861	91.78713	105.49518
##	[52,]	NA	NA	56.40647	97.63231	105.49201	96.77238	67.12309
##	[53,]	NA	NA	NA	95.36332	91.33587	90.21564	46.80241
##	[54,]	NA	NA	NA	NA	96.09487	123.04038	70.44029
##	[55,]	NA	NA	NA	NA	NA	105.12407	112.10242
##	[56,]	NA	NA	NA	NA	NA	NA	93.40498
##	[57,]	NA	NA	NA	NA	NA	NA	NA
##	[58,]	NA	NA	NA	NA	NA	NA	NA
##	[59,]	NA	NA	NA	NA	NA	NA	NA
##	[60,]	NA	NA	NA	NA	NA	NA	NA
##	[61,]	NA	NA	NA	NA	NA	NA	NA
##	[62,]	NA	NA	NA	NA	NA	NA	NA
##	[63,]	NA	NA	NA	NA	NA	NA	NA
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA

##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,58]	[,59]	[,60]	[,61]	[,62]	[,63]	[,64]
##	[1,]	126.81117	86.84353	104.69138	83.28171	85.89616	85.65498	109.82154
##	[2,]	95.01499	112.98407	87.41001	85.18562	104.48231	105.54867	83.06240
##	[3,]	49.22614	113.98617	67.21112	79.10392	99.67253	92.79466	80.88102
##	[4,]	92.78485	64.31990	78.59315	132.64871	112.30297	100.34142	95.62673
##	[5,]	66.70054	137.73741	95.28994	74.56062	94.69651	59.21990	61.21659
##	[6,]	66.81981	78.55979	77.74506	109.20083	83.49021	52.68843	48.04190
##	[7,]	98.14598	59.19156	106.38940	67.54310	89.21244	86.88687	98.27292
##	[8,]	114.35207	69.63347	113.93000	70.61340	89.81944	106.85781	99.60617
##	[9,]	111.16405	85.55706	97.73932	69.66975	73.95734	95.47113	104.19269
##	[10,]	68.85070	119.40553	81.18833	72.19422	87.19653	95.45792	84.04275
##	[11,]	98.64586	97.00480	87.39807	96.97544	74.88223	131.67837	104.39473
##	[12,]	109.78834	117.15161	102.36791	79.97874	79.10049	82.28635	71.99937
##	[13,]	63.47395	118.90692	74.82954	84.39696	80.90340	103.93046	98.39764
##	[14,]	83.53650	92.30118	70.79714	62.33164	109.12099	83.96594	76.21065
##	[15,]	52.54427	91.74157	67.83730	129.97183	91.67735	98.97248	73.89169
##	[16,]	64.67737	86.75995	82.05027	87.38830	102.78799	76.54641	78.16864
##	[17,]	78.95119	108.06823	119.45331	95.27736	77.17660	102.68266	103.58561
##	[18,]	100.46637	85.00067	100.89426	114.90007	58.09408	112.57843	119.98475
##	[19,]	62.11932	73.88904	82.31045	93.15614	95.11885	92.30977	105.45661
##	[20,]	82.89670	120.61092	101.56636	51.39483	78.34568	62.59795	67.64541
##	[21,]	38.52614	108.75798	74.97159	87.95432	93.52954	52.74592	49.63672
##	[22,]	101.45902	84.35698	80.47145	114.92615	87.50722	144.17521	115.49889
##	[23,]	86.97049	109.84979	87.30602	68.31816	105.66068	62.00583	39.48061
##	[24,]	102.77379	65.44467	104.32223	120.08189	91.67050	96.89491	89.34240
##	[25,]	71.94809	82.59248	68.02261	94.11407	95.84123	75.65378	86.68753
##	[26,]	65.59394	103.00325	47.38320	110.25665	116.99787	106.64986	95.77638
##	[27,]	121.98913	94.53898	103.80102	72.43967	65.57554	79.39695	99.26951
##	[28,]	65.18548	76.15968	103.00347	82.03668	101.31591	101.85901	83.86055
##	[29,]	96.21439	82.46998	69.58294	113.20100	119.28231	92.68343	107.07569
##	[30,]	61.54503	80.54597	106.58951	90.05423	72.79024	69.75871	53.84470
##	[31,]	79.33359	96.28212	61.65157	95.03605	105.97556	103.13573	100.11427
##	[32,]	130.60991	59.28097	102.68916	117.93833	83.56334	104.07286	108.15259
##	[33,]	99.26380	83.49812	54.57261	61.22985	142.38363	104.20502	111.72226
##	[34,]	130.55299	54.37683	96.67287	94.33902	106.08759	119.97538	118.16872
##	[35,]	98.91301	98.13957	71.04531	102.19370	86.82929	115.51765	135.81017
##	[36,]	81.93534	115.95107	64.44470	90.16108	109.60622	99.99483	84.86765
##	[37,]	88.64110	79.52708	136.35951	92.44301	44.17626	101.69113	98.09481

##	[38,]	96.71201	74.50444	62.25939	92.68731	92.66250	105.01941	114.00594
##	[39,]	56.44500	79.30179	80.47331	107.73320	93.11091	107.60925	88.66207
##	[40,]	95.12983	122.72514	63.28510	75.54905	123.12684	107.74945	102.53376
##	[41,]	120.79343	52.70538	115.30344	107.20929	77.83277	122.62594	114.62546
##	[42,]	128.92895	83.66608	111.02652	71.19738	97.37706	114.49042	107.02072
##	[43,]	98.72488	119.97184	87.65060	85.88552	104.95250	107.60133	85.55474
##	[44,]	84.76092	91.57263	87.31426	109.69315	104.76531	83.47882	82.03113
##	[45,]	93.47491	91.62539	86.85324	79.71343	94.99511	99.47688	108.87027
##	[46,]	117.77573	80.79782	71.71847	101.92466	81.88992	95.95069	105.87426
##	[47,]	139.48704	73.01012	72.97378	96.12644	113.86059	103.50271	112.76646
##	[48,]	125.73518	58.29956	113.87943	93.64686	90.15489	112.07493	94.17617
##	[49,]	100.68239	97.77745	96.32237	58.01214	76.51116	71.43168	98.67724
##	[50,]	106.48483	108.50860	64.57617	67.93672	123.59441	83.91243	88.16205
##	[51,]	113.84441	49.51041	59.12689	114.08471	105.47517	97.04775	98.59577
##	[52,]	94.25222	68.23965	98.68245	73.04715	93.53954	93.58328	91.42751
##	[53,]	87.59061	111.50913	111.33885	55.47383	78.07953	92.36386	98.94591
##	[54,]	70.82508	108.02375	73.11654	94.47542	82.91827	69.30791	82.15567
##	[55,]	50.60873	92.72039	99.02211	86.31261	72.26921	83.07232	85.15984
##	[56,]	120.81436	87.43390	110.14150	77.21108	103.67589	76.54710	83.63622
##	[57,]	104.71325	100.84422	96.52160	79.54980	79.25613	92.22138	115.50379
##	[58,]	NA	113.15091	84.68453	95.41358	80.64251	71.99016	61.91911
##	[59,]	NA	NA	96.13304	103.62550	97.27146	107.85540	109.51168
##	[60,]	NA	NA	NA	98.59214	124.50416	89.36119	91.34104
##	[61,]	NA	NA	NA	NA	104.19152	73.37075	85.79567
##	[62,]	NA	NA	NA	NA	NA	85.47556	82.49991
##	[63,]	NA	NA	NA	NA	NA	NA	41.65095
##	[64,]	NA	NA	NA	NA	NA	NA	NA
##	[65,]	NA	NA	NA	NA	NA	NA	NA
##	[66,]	NA	NA	NA	NA	NA	NA	NA
##	[67,]	NA	NA	NA	NA	NA	NA	NA
##	[68,]	NA	NA	NA	NA	NA	NA	NA
##	[69,]	NA	NA	NA	NA	NA	NA	NA
##	[70,]	NA	NA	NA	NA	NA	NA	NA
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA

##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,65]	[,66]	[,67]	[,68]	[,69]	[,70]	[,71]
##	[1,]	80.11754	90.51814	102.75331	76.51891	75.67960	114.10180	112.18659
##	[2,]	87.76240	77.69642	87.32514	122.06117	88.60525	62.38321	83.61566
##	[3,]	107.99509	72.23484	67.86783	114.61380	88.85589	52.88848	63.32718
##	[4,]	85.99155	131.27303	115.17096	71.37069	72.36853	111.95753	90.59846
##	[5,]	98.80936	92.73704	87.67547	108.26048	91.36396	91.50868	60.81835
##	[6,]	83.69150	128.53731	74.10459	74.07603	65.60226	99.08473	98.36323
##	[7,]	85.30582	89.36652	82.82840	83.38828	105.75170	91.00500	80.26996
##	[8,]	89.72465	89.53303	83.73378	115.86345	83.23680	52.03251	99.23595
##	[9,]	85.51870	59.45197	74.00924	94.74789	79.19775	91.04182	119.24056
##	[10,]	91.75956	50.70393	76.76267	104.12200	143.12036	83.23205	65.03376
##	[11,]	93.27313	56.36732	84.97686	116.03200	101.73532	75.20084	119.73416
##	[12,]	75.07712	76.18023	84.21547	107.07070	92.53283	93.00019	108.85530
##	[13,]	106.48582	41.44277	84.93678	95.67123	119.49657	87.31171	75.03650
##	[14,]	75.45506	82.76502	34.99730	125.85638	67.51972	72.24370	93.93743
##	[15,]	108.33070	109.59250	89.22084	101.60641	67.39310	80.96536	94.22819
##	[16,]	96.80229	117.26440	73.60161	107.67557	72.60264	87.30359	79.85688
##	[17,]	136.10627	81.32055	125.96548	104.56129	82.74768	88.72986	77.41078
##	[18,]	107.47863	82.28881	122.79986	68.40820	101.99324	94.32817	114.28211
##	[19,]	112.50840	93.01053	89.25253	85.13765	77.85829	107.42306	77.01039
##	[20,]	84.69466	59.75709	67.85254	103.13217	109.36696	101.56999	78.74812
##	[21,]	102.75093	111.93545	70.95289	95.47733	77.14894	68.02274	61.81589
##	[22,]	87.39582	66.45935	104.91292	92.27158	119.44504	95.91526	106.10970
##	[23,]	68.10912	97.71735	58.72492	117.26079	82.92380	69.80557	78.21038
##	[24,]	92.31837	127.34360	110.29628	91.42307	58.85921	108.61992	112.30314
##	[25,]	92.23100	114.69541	76.67299	78.84487	73.41100	67.61516	85.70006
##	[26,]	96.30655	104.52058	84.84065	103.92034	77.39348	64.64293	80.26995
##	[27,]	74.71606	61.50716	93.08264	61.66163	107.59871	103.51520	107.47017
##	[28,]	117.00111	98.04497	86.57790	123.08426	82.54476	49.72639	59.24944
##	[29,]	79.96065	118.71963	109.03569	68.80902	77.81141	122.36669	86.10617
##	[30,]	108.57367	87.88413	82.73615	90.43194	77.00936	90.47122	78.49239
##	[31,]	90.73734	80.00941	76.85339	100.55587	73.18538	94.82487	94.42573
##	[32,]	80.30774	108.53373	122.77160	58.72186	79.96799	100.08844	118.01393
##	[33,]	60.91935	86.04720	55.82063	108.38463	97.45523	76.73200	75.56059
##	[34,]	66.81905	95.62756	98.30324	91.30094	99.23599	115.29450	108.46869
##	[35,]	92.69977	76.35223	102.21579	78.43488	99.52282	102.36606	108.76780
##	[36,]	73.20378	83.44964	81.34842	104.30651	128.82945	84.10147	73.56814
##	[37,]	131.16639	70.77900	113.41885	90.35217	86.80814	77.89537	99.49205
##	[38,]	70.66460	76.30897	71.79464	78.65075	102.59521	117.43007	113.22765
##	[39,]	107.11037	92.66248	91.10088	98.42630	105.32282	88.56655	73.72808
##	[40,]	77.55891	81.60421	77.47608	121.55272	99.01312	57.90218	77.94755
##	[41,]	98.16837	96.94735	114.51542	88.14514	77.89460	78.56719	117.43634
##	[42,]	82.58447	83.30302	88.65947	124.12287	82.21369	65.80268	106.03883
##	[43,]	83.48863	77.15056	92.70238	120.19112	103.45466	66.38577	81.04739
##	[44,]	94.75733	108.71264	110.26577	78.24889	70.21250	103.59321	76.82703

##	[45,]	98.30076	93.88019	79.52426	113.15484	65.35541	70.32622	102.98500
##	[46,]	54.64551	78.37206	87.88213	55.98661	114.23223	134.36034	124.99344
##	[47,]	47.06140	106.61690	85.50090	85.21718	78.77802	110.52031	125.78735
##	[48,]	82.31496	98.92180	95.94004	104.52971	74.41029	71.16652	113.15082
##	[49,]	88.74547	68.31029	79.43176	75.56365	88.48059	81.33873	91.22523
##	[50,]	51.29257	98.16054	67.62866	101.20222	107.31102	68.15424	79.62711
##	[51,]	50.54761	120.30048	78.73564	64.82978	79.76210	102.22764	123.75269
##	[52,]	97.10054	97.09476	72.63518	109.21085	60.12031	42.30452	93.39062
##	[53,]	112.60143	59.82047	89.56306	109.49948	99.02448	50.83009	72.18199
##	[54,]	97.36928	94.15134	77.62005	86.99960	61.02669	101.54313	102.18120
##	[55,]	118.38160	68.80116	96.10488	79.10735	117.43683	105.18476	58.72405
##	[56,]	69.55370	102.57781	104.34185	80.37063	98.29760	95.60444	76.42440
##	[57,]	100.32181	77.66387	100.10793	82.18134	79.88013	77.78282	99.12254
##	[58,]	128.26467	89.47661	85.71594	99.57713	86.61548	79.94556	57.03010
##	[59,]	81.28525	112.15572	93.91805	76.66434	69.65673	100.52589	111.31490
##	[60,]	57.41490	104.36906	59.05136	85.76222	82.88048	85.33643	96.38407
##	[61,]	79.39283	67.88953	56.22756	116.69002	99.89238	67.83957	64.79397
##	[62,]	120.70898	63.84633	113.31137	71.70612	103.01900	106.31914	108.59007
##	[63,]	81.79348	107.74999	70.49442	76.20871	76.05431	94.79361	75.52723
##	[64,]	87.94353	105.89253	68.04345	98.56424	76.75680	80.10591	79.22242
##	[65,]	NA	104.11078	58.07067	82.83686	90.68870	95.82677	110.90027
##	[66,]	NA	NA	90.71900	99.22678	131.06604	89.82989	87.18262
##	[67,]	NA	NA	NA	114.41820	77.71203	66.14913	91.41171
##	[68,]	NA	NA	NA	NA	95.50107	132.57033	105.00197
##	[69,]	NA	NA	NA	NA	NA	77.77734	103.34004
##	[70,]	NA	NA	NA	NA	NA	NA	73.92566
##	[71,]	NA	NA	NA	NA	NA	NA	NA
##	[72,]	NA	NA	NA	NA	NA	NA	NA
##	[73,]	NA	NA	NA	NA	NA	NA	NA
##	[74,]	NA	NA	NA	NA	NA	NA	NA
##	[75,]	NA	NA	NA	NA	NA	NA	NA
##	[76,]	NA	NA	NA	NA	NA	NA	NA
##	[77,]	NA	NA	NA	NA	NA	NA	NA
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA

##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,72]	[,73]	[,74]	[,75]	[,76]	[,77]	[,78]
##	[1,]	110.41418	60.68545	114.08593	102.99906	125.18155	106.55911	65.86617
##	[2,]	82.49636	92.83018	90.54822	107.88690	79.03979	37.21738	68.29867
##	[3,]	79.36427	80.76970	65.31174	108.21367	52.34699	64.27151	101.11633
##	[4,]	102.35784	91.78837	75.13896	95.84570	96.60974	84.87289	70.58544
##	[5,]	98.24763	89.45079	77.78294	116.29629	81.63898	95.15731	50.91598
##	[6,]	66.65454	117.40959	78.14549	72.13430	86.44351	123.81666	84.77727
##	[7,]	91.14029	109.57029	101.10078	41.45110	78.03909	115.40019	119.10873
##	[8,]	73.55649	104.33887	107.23002	59.79177	81.54172	94.48771	114.15524
##	[9,]	96.91439	71.32960	113.74678	97.95937	110.17122	95.85523	88.94138
##	[10,]	86.81011	104.45759	77.21546	89.59721	74.36205	63.93833	104.51405
##	[11,]	82.85078	91.63705	86.71319	106.28247	110.80631	66.42657	105.88195
##	[12,]	84.26637	100.83688	107.48985	101.60325	112.85299	79.36116	54.96403
##	[13,]	101.07644	71.95446	78.57088	118.34973	80.38259	60.50154	104.26983
##	[14,]	78.58909	98.74077	70.72554	95.13447	87.78772	91.67723	67.73696
##	[15,]	81.21817	95.96508	52.03759	115.37087	85.49759	86.63875	89.03870
##	[16,]	87.89149	99.81596	50.39869	92.19028	88.41998	132.33209	85.17367
##	[17,]	129.08871	57.68704	94.92275	138.99422	89.01894	92.96377	82.57338
##	[18,]	91.59899	66.72898	102.65257	93.98023	110.27611	97.75175	135.92259
##	[19,]	122.79687	69.14880	64.84162	109.63306	87.59473	119.80632	94.63159
##	[20,]	99.13709	100.69152	99.29480	94.88508	91.84055	98.31511	66.28887
##	[21,]	65.43285	100.63444	65.00541	85.91967	52.55611	104.74183	94.74891
##	[22,]	95.06874	94.56683	83.46098	99.06132	107.88301	49.21691	105.88748
##	[23,]	62.51696	129.47188	90.30423	76.17016	71.33717	74.68312	52.45597
##	[24,]	103.43603	99.00548	87.05428	98.77818	116.24451	114.15053	65.16388
##	[25,]	59.44339	82.28069	71.91413	72.24782	71.29017	108.47765	122.13185
##	[26,]	73.80625	73.23859	39.22980	115.08970	79.22119	66.85352	95.04456
##	[27,]	89.27266	76.17605	141.19658	75.36321	103.42340	85.40069	97.76331
##	[28,]	88.26107	109.43697	77.30935	77.58595	43.05724	89.99810	110.94414
##	[29,]	111.85333	67.41713	69.11324	111.52906	108.16514	89.38037	58.81503
##	[30,]	97.17014	114.41962	105.72063	83.46404	60.08237	96.55902	84.18097
##	[31,]	103.93096	65.77326	65.24749	131.33948	99.87501	75.06413	67.84167
##	[32,]	87.92270	84.77658	122.71466	73.21830	105.88894	83.32173	97.53801
##	[33,]	82.26079	87.26276	56.80121	79.87690	85.99193	75.01669	87.61577
##	[34,]	107.35061	105.17932	89.22742	76.54203	124.05094	93.91500	79.94949
##	[35,]	100.21051	41.61263	73.40187	119.56875	125.26644	91.17271	107.44412
##	[36,]	72.84574	109.92259	57.50431	88.64999	88.35864	58.38807	89.10762
##	[37,]	103.42912	81.76529	128.55870	90.09757	80.96478	102.89990	126.03115
##	[38,]	95.15084	84.41908	68.73388	90.84771	124.82906	101.71980	99.45294
##	[39,]	93.67566	111.19325	56.63983	87.85801	75.34588	90.47606	113.06949
##	[40,]	72.81718	75.33065	61.93662	107.59058	87.53573	50.73342	82.68499
##	[41,]	89.74583	90.10958	115.56506	74.57936	98.54623	91.38228	116.78768
##	[42,]	86.94043	92.06704	104.67565	85.90860	101.95658	82.63030	85.22293
##	[43,]	80.37627	96.91218	87.65384	104.12036	83.92255	33.47400	71.50393
##	[44,]	108.71829	79.03875	92.27333	112.46110	81.42669	71.58052	51.95669
##	[45,]	87.34592	63.90694	73.23593	107.33780	103.69942	113.31849	96.44735
##	[46,]	88.69337	90.99304	94.43376	80.88616	138.44560	89.51018	90.51675
##	[47,]	86.99938	84.83477	82.73562	88.95012	142.41712	92.26031	63.56878
##	[48,]	79.66141	112.59392	116.21836	65.65275	92.53629	81.35838	93.01818
##	[49,]	86.05949	60.12331	120.71942	82.06190	82.84724	96.92636	104.82250
##	[50,]	51.44782	100.45750	72.48820	66.66207	86.94275	71.00768	87.39665
##	[51,]	62.72724	104.83947	78.45850	57.26898	113.34895	96.05448	99.09377

##	[52,]	69.24023	91.33051	99.74418	67.60108	65.18019	98.25848	114.29006
##	[53,]	88.29413	69.79914	109.74185	91.79138	63.76634	81.69238	115.73871
##	[54,]	94.95678	60.45552	73.57907	128.27199	107.29133	114.62545	70.25655
##	[55,]	115.28880	93.67031	87.90251	91.43968	66.11886	98.90116	110.29184
##	[56,]	91.09353	104.12306	120.01598	64.57490	82.34215	77.09581	67.00523
##	[57,]	92.51803	38.00346	109.24375	104.85408	95.62446	92.16384	104.28070
##	[58,]	94.64919	90.22550	65.40798	112.34151	55.40659	97.63962	95.54975
##	[59,]	96.25440	101.37793	97.66785	60.95563	99.17465	109.58673	102.20779
##	[60,]	58.92096	82.78494	43.85363	93.29232	98.14314	73.86335	83.96542
##	[61,]	86.67248	93.83712	97.84823	73.26128	69.05709	92.03719	84.34076
##	[62,]	102.79345	87.77976	126.42386	97.99279	99.27149	105.94869	113.38468
##	[63,]	74.61346	99.77891	98.16043	77.22537	73.10823	114.81822	67.70590
##	[64,]	64.54725	127.10418	90.65654	79.63610	66.83109	97.75460	67.52426
##	[65,]	56.05795	107.49503	83.79638	58.89480	112.70908	80.26827	69.92021
##	[66,]	107.64975	78.27487	108.04244	103.91595	91.66246	70.41796	108.96066
##	[67,]	52.62387	109.87593	68.62022	70.41262	82.00707	93.39632	80.22570
##	[68,]	96.77068	73.14714	110.59691	81.81304	106.65969	100.47844	99.21808
##	[69,]	80.13355	84.90984	82.52979	94.35932	87.04044	112.53027	70.56061
##	[70,]	57.85248	97.14865	79.86699	80.81144	52.41791	71.89564	104.49829
##	[71,]	104.17395	89.07393	78.74340	93.86721	37.28933	80.95513	85.72853
##	[72,]	NA	113.28137	78.45695	60.08250	84.20604	79.81821	95.54452
##	[73,]	NA	NA	89.49360	127.54996	99.46631	88.49680	97.49144
##	[74,]	NA	NA	NA	106.58692	89.67878	87.33002	83.00755
##	[75,]	NA	NA	NA	NA	79.03248	97.79442	104.23281
##	[76,]	NA	NA	NA	NA	NA	80.30609	99.30865
##	[77,]	NA	NA	NA	NA	NA	NA	88.76164
##	[78,]	NA	NA	NA	NA	NA	NA	NA
##	[79,]	NA	NA	NA	NA	NA	NA	NA
##	[80,]	NA	NA	NA	NA	NA	NA	NA
##	[81,]	NA	NA	NA	NA	NA	NA	NA
##	[82,]	NA	NA	NA	NA	NA	NA	NA
##	[83,]	NA	NA	NA	NA	NA	NA	NA
##	[84,]	NA	NA	NA	NA	NA	NA	NA
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,79]	[,80]	[,81]	[,82]	[,83]	[,84]	[,85]
##	[1,]	112.78636	90.13496	124.25554	85.12431	94.95979	112.93388	97.54438
##	[2,]	90.74477	50.07845	80.75850	84.63440	75.05193	85.97629	85.02734
##	[3,]	73.01201	68.14990	62.02095	64.74728	97.02559	63.98014	112.51426
##	[4,]	107.41239	75.90009	92.50272	120.62137	92.10283	97.45704	98.66752

##	[5,]	61.03987	76.88850	115.66502	90.94790	60.05157	55.33888	85.47923
##	[6,]	78.25788	89.33371	72.07398	101.40812	82.59217	95.62155	84.94075
##	[7,]	95.24226	130.92499	85.24856	102.38088	97.90514	97.28396	76.05378
##	[8,]	112.50267	103.97681	83.54179	85.49527	70.35552	119.65060	64.90281
##	[9,]	96.50384	82.39350	95.59281	47.78878	111.80924	111.38781	97.56089
##	[10,]	54.17689	94.75370	79.80004	87.71225	91.27463	41.71303	84.59024
##	[11,]	82.48706	77.14466	89.49917	59.04462	83.89636	87.71702	80.19561
##	[12,]	79.35608	68.95471	105.96569	83.18791	66.02912	91.43236	66.84462
##	[13,]	60.66943	84.03441	83.45750	61.64257	116.08820	54.39568	108.52858
##	[14,]	85.10663	45.94594	77.16585	63.26004	83.82508	80.42255	104.72324
##	[15,]	74.17734	64.51460	79.78965	78.59818	78.96603	78.26408	96.64039
##	[16,]	79.67331	89.62108	103.47453	90.01613	60.10059	68.73243	93.85954
##	[17,]	79.23043	94.42482	137.44916	63.62555	83.76963	86.77929	85.34420
##	[18,]	100.12533	129.61396	101.49037	83.58133	97.01189	106.62464	85.72401
##	[19,]	80.37440	94.44184	106.11433	69.48608	113.52025	74.36918	118.38858
##	[20,]	53.24758	87.35168	106.46133	74.74626	86.81673	64.56707	78.07891
##	[21,]	69.69727	89.33794	68.04483	93.38388	74.58357	70.43616	95.96891
##	[22,]	88.34824	84.04027	85.84169	89.97424	99.04332	81.55056	85.25617
##	[23,]	78.14663	56.33672	70.52479	101.94148	59.91397	83.04438	70.95922
##	[24,]	100.00805	81.96298	119.67286	97.45920	67.78397	110.47841	73.47574
##	[25,]	105.56506	103.46112	60.32943	96.91787	88.92294	94.95294	111.76044
##	[26,]	98.21591	60.96038	71.09197	90.86708	78.03513	67.72429	124.48765
##	[27,]	99.69724	110.15989	87.26586	86.76504	118.77465	113.59532	87.42401
##	[28,]	84.08248	95.81821	78.15209	84.42392	76.85597	87.56548	75.00784
##	[29,]	109.64487	72.82165	107.36447	115.40727	94.95958	82.01430	121.51043
##	[30,]	59.31885	86.93144	75.99686	71.67922	110.77063	99.69951	71.52790
##	[31,]	87.91975	44.71049	90.95458	63.24769	106.36302	74.90461	127.93215
##	[32,]	129.87373	102.79512	86.15779	111.78423	101.07447	143.65521	80.93842
##	[33,]	111.52178	68.51444	73.36227	101.35400	88.62578	65.57718	124.58989
##	[34,]	109.39843	90.92466	111.31114	109.76355	83.61960	96.43790	78.66237
##	[35,]	103.79489	96.64188	109.09748	78.18600	98.36891	78.60538	123.43787
##	[36,]	76.47082	79.66052	79.80664	117.12873	64.43048	41.38791	88.55777
##	[37,]	82.66502	125.43538	100.74251	54.37841	104.74587	123.14353	62.71141
##	[38,]	90.40406	88.82852	91.46212	82.39209	109.33700	74.40778	114.34954
##	[39,]	66.53012	98.24682	83.01512	92.64598	88.14653	62.35472	84.68000
##	[40,]	103.90484	60.43238	83.33020	95.81786	62.19770	62.41850	111.01481
##	[41,]	120.45870	108.43130	91.38150	87.51911	90.82676	141.03056	69.31775
##	[42,]	114.24852	82.02709	103.51587	82.17261	63.48176	111.26494	71.67659
##	[43,]	89.20827	60.25502	85.90724	97.05339	64.75773	76.70388	79.24729
##	[44,]	94.38518	63.45822	93.05528	100.67491	101.64346	95.34941	101.43236
##	[45,]	106.19134	85.59323	107.15138	64.67148	70.14921	92.91888	106.42464
##	[46,]	95.49366	95.17623	90.29714	103.77126	109.41954	88.58048	98.23641
##	[47,]	128.12247	68.52376	102.51453	109.33043	77.23378	101.18279	103.62542
##	[48,]	115.83192	87.01471	82.70311	93.61639	77.78606	136.77624	58.08890
##	[49,]	102.84126	106.14883	81.31887	71.70073	117.09559	108.38777	106.78502
##	[50,]	110.54838	81.79191	69.96691	129.14684	56.24722	71.13520	97.89327
##	[51,]	123.92923	86.25483	61.96081	120.51733	93.96720	109.55486	102.29449
##	[52,]	113.59996	92.53774	65.77488	73.02433	87.61509	123.95400	88.29169
##	[53,]	90.06025	107.94373	89.60081	65.10752	90.26960	93.46760	86.34979
##	[54,]	80.20871	70.48628	104.22005	60.58736	93.26685	81.77568	119.55152
##	[55,]	48.65883	117.87442	93.27040	78.96913	119.27897	63.72356	87.03794
##	[56,]	108.20266	95.43513	92.28461	131.93828	81.51003	105.61908	70.33719
##	[57,]	113.88297	100.90161	98.19087	69.84421	101.57651	110.11949	110.26540
##	[58,]	45.37061	89.09837	86.07785	69.97126	91.25420	58.49340	94.81257

##	[59,]	120.02899	99.45251	83.89183	97.98811	106.44024	128.50248	87.19242
##	[60,]	106.47692	54.36487	56.50289	105.06958	88.24845	68.67915	138.92867
##	[61,]	88.55828	90.11212	87.54647	82.39570	84.02054	78.27328	90.45650
##	[62,]	57.69150	125.95099	106.09674	59.88249	108.65242	104.71720	60.06809
##	[63,]	75.82763	90.52495	80.59644	99.45495	86.13838	88.67135	89.89201
##	[64,]	59.76306	76.05172	71.97650	93.98838	69.82550	84.95458	68.22159
##	[65,]	120.90918	66.90125	65.47191	126.15119	79.26753	93.81789	102.37103
##	[66,]	64.37450	102.98190	99.58361	55.72462	112.14620	73.98045	83.48899
##	[67,]	91.35276	59.89669	56.56905	85.01097	77.56057	78.21731	104.97081
##	[68,]	100.62328	115.69436	87.26482	108.87935	128.19976	108.67158	102.50389
##	[69,]	111.25867	63.23228	82.23243	80.32868	83.12625	119.92874	103.86647
##	[70,]	98.48610	75.80045	60.56648	80.51943	65.75904	90.72517	88.71675
##	[71,]	71.85192	94.91875	91.22991	97.84065	86.65273	57.29329	93.47222
##	[72,]	105.28664	72.31556	38.86422	108.10235	65.33607	95.79240	92.51169
##	[73,]	105.41142	94.49012	107.46903	71.23291	115.54885	89.69068	131.97113
##	[74,]	88.78554	60.54118	82.75533	96.47511	67.50385	49.09161	120.49496
##	[75,]	109.43068	106.81815	58.39474	120.58603	86.95388	112.48776	72.32303
##	[76,]	77.33042	93.22675	66.24022	88.75412	90.88051	82.48279	86.01013
##	[77,]	95.63090	66.96544	68.38064	99.99596	91.20986	77.70287	95.51219
##	[78,]	88.82590	48.95181	103.57824	102.50807	71.46439	82.05038	93.10560
##	[79,]	NA	98.46763	104.63604	65.36552	90.04066	57.93633	66.05332
##	[80,]	NA	NA	73.23556	89.26533	73.01930	79.73692	111.57897
##	[81,]	NA	NA	NA	103.21620	95.98571	98.18511	103.45446
##	[82,]	NA	NA	NA	NA	106.78266	91.48531	90.40385
##	[83,]	NA	NA	NA	NA	NA	76.19678	70.54998
##	[84,]	NA	NA	NA	NA	NA	NA	103.09140
##	[85,]	NA	NA	NA	NA	NA	NA	NA
##	[86,]	NA	NA	NA	NA	NA	NA	NA
##	[87,]	NA	NA	NA	NA	NA	NA	NA
##	[88,]	NA	NA	NA	NA	NA	NA	NA
##	[89,]	NA	NA	NA	NA	NA	NA	NA
##	[90,]	NA	NA	NA	NA	NA	NA	NA
##	[91,]	NA	NA	NA	NA	NA	NA	NA
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,86]	[,87]	[,88]	[,89]	[,90]	[,91]	[,92]
##	[1,]	87.55629	117.30465	65.27000	59.49894	65.49559	91.27943	106.23791
##	[2,]	78.12841	77.97323	114.69685	84.17390	69.00798	104.86763	61.26024
##	[3,]	75.25660	88.63362	127.41933	90.87544	89.27728	108.73543	81.15022
##	[4,]	88.65919	100.66546	95.52494	73.71937	94.65139	73.62849	110.54857
##	[5,]	100.98971	75.19209	96.53697	91.59301	82.43354	61.26896	72.15026
##	[6,]	74.89693	81.73531	79.75560	94.26199	98.77007	59.49791	100.51878
##	[7,]	125.06252	81.96024	93.98982	118.40146	128.35023	82.54586	96.07367
##	[8,]	86.05113	71.61896	99.04261	109.75441	108.33039	104.57209	74.84485
##	[9,]	76.38275	111.82220	79.61335	60.05493	52.99445	126.29798	86.83269
##	[10,]	117.79950	72.20038	100.17386	114.98552	93.03965	99.21775	63.26735
##	[11,]	71.09448	85.02255	80.75776	80.42239	57.95111	143.68152	56.64087

##	[12,]	84.88301	77.08149	73.11087	80.78008	50.54373	91.91007	57.01739
##	[13,]	93.43890	95.61385	99.29718	87.44951	75.75933	116.79732	78.81108
##	[14,]	81.72317	103.42443	114.14893	56.83694	53.31407	117.52463	74.63269
##	[15,]	56.82544	84.05207	98.91361	77.55875	81.75609	95.32595	82.51356
##	[16,]	93.85478	88.79328	96.28287	85.44529	98.06269	79.20020	89.99655
##	[17,]	84.78428	82.57562	94.40775	83.14087	88.28742	89.03197	77.70270
##	[18,]	72.46488	91.64320	51.40618	103.79932	103.48964	100.45135	102.91770
##	[19,]	98.88706	114.92444	102.09763	66.01555	92.11305	96.43437	108.76776
##	[20,]	116.55596	80.14633	87.15786	90.40654	69.08885	84.06457	63.02024
##	[21,]	78.22912	73.46583	105.90402	111.30022	115.30643	61.20273	94.17109
##	[22,]	92.45798	89.39350	84.49132	87.11503	75.26837	124.82379	73.63088
##	[23,]	92.28074	64.23608	111.06632	97.81808	79.48791	73.01720	60.53049
##	[24,]	80.91059	87.47519	78.36802	69.50455	80.90816	78.68311	87.31119
##	[25,]	67.27119	98.86087	91.38711	103.65464	120.64421	82.99859	123.08804
##	[26,]	61.59672	103.98393	109.18995	77.37194	87.16020	105.64394	100.63413
##	[27,]	93.33404	99.89938	61.84110	95.73566	82.74086	92.62166	101.07984
##	[28,]	95.94951	59.77991	137.33004	116.04853	128.64580	88.92048	71.54228
##	[29,]	95.41240	125.02826	88.64200	56.44289	80.13759	78.41207	123.41100
##	[30,]	90.60700	65.60738	111.08659	97.88770	96.89948	74.35802	73.44439
##	[31,]	74.60997	124.33809	104.47870	34.60467	44.79813	121.84895	93.38333
##	[32,]	75.38365	95.07678	69.65593	92.25707	100.01497	84.10072	111.96046
##	[33,]	110.27602	120.72437	118.44514	72.87301	82.93382	117.31850	100.87746
##	[34,]	119.27444	100.00360	82.37869	74.67249	79.92651	102.85285	86.04371
##	[35,]	77.78559	128.89496	61.83208	66.36451	71.90735	120.77562	112.63467
##	[36,]	109.38850	78.09601	94.67195	107.01291	90.04568	91.60852	72.63771
##	[37,]	76.37932	66.91780	82.97893	110.32187	108.31879	96.52747	77.05857
##	[38,]	99.21348	126.69805	70.94083	61.27955	64.14872	122.49944	103.06397
##	[39,]	103.86873	73.87780	105.34229	105.77182	110.68913	92.64273	78.39240
##	[40,]	83.59673	99.68582	106.44619	83.20240	75.53837	112.71165	82.99257
##	[41,]	73.52692	82.40507	81.95029	97.37390	104.29898	103.99165	90.55818
##	[42,]	86.21900	84.05878	94.44082	84.43060	77.94381	113.65371	67.75989
##	[43,]	87.89048	72.44536	106.30810	94.73498	74.93688	99.55968	58.49040
##	[44,]	84.59358	97.09762	106.68809	70.85902	82.95661	70.04090	101.03189
##	[45,]	67.27889	108.67158	86.55504	68.23584	78.00099	114.47752	94.97812
##	[46,]	100.12839	116.38078	46.30482	74.34394	64.09974	102.76815	104.72919
##	[47,]	88.01652	125.83659	68.69947	49.61188	55.13447	105.98764	105.24698
##	[48,]	79.83994	72.17526	95.58461	95.48839	93.15741	100.23229	73.11388
##	[49,]	82.47138	108.08200	83.03964	91.66418	92.19376	95.88976	111.32894
##	[50,]	99.91468	92.13152	93.15098	105.88509	96.75975	86.94720	94.38230
##	[51,]	79.48325	113.52289	72.16347	78.75479	88.80140	96.69156	120.16202
##	[52,]	66.78487	85.41639	112.29781	97.60080	108.21271	104.22906	92.24940
##	[53,]	86.42260	77.55407	103.06107	113.43852	106.65889	100.79938	79.78666
##	[54,]	61.42169	117.74012	75.96626	49.69268	56.00393	94.64269	103.57872
##	[55,]	120.25814	77.01946	100.05430	111.43694	113.78700	78.65077	85.63589
##	[56,]	115.66172	76.83242	94.75214	109.01517	106.96805	56.68022	91.87742
##	[57,]	65.89575	112.04530	77.24806	81.78061	87.21140	103.65505	112.04380
##	[58,]	84.26951	71.94755	110.20407	101.68461	103.89020	75.04179	80.46100
##	[59,]	92.53988	102.61057	92.08396	79.20930	101.40181	98.01767	108.09742
##	[60,]	71.89099	127.23425	92.34037	64.38273	69.72081	106.61001	116.05752
##	[61,]	117.07391	87.95338	114.36207	98.63726	92.82187	94.24461	77.98994
##	[62,]	80.25355	66.64238	54.41120	108.43988	91.70299	85.32361	74.72438
##	[63,]	89.60561	83.15000	86.94982	99.93090	97.70426	43.86871	100.73301
##	[64,]	81.58219	56.21146	97.27957	107.21220	92.57731	54.38810	69.85853
##	[65,]	94.29914	113.51901	79.51589	75.29556	69.31119	95.28016	104.64076

##	[66,]	105.38000	84.45596	86.03417	97.31900	76.23246	119.89526	64.29714
##	[67,]	85.12185	100.32368	106.96600	78.06194	71.77958	105.42532	85.27321
##	[68,]	87.85961	110.54636	53.39838	90.53842	99.25237	69.38499	134.95944
##	[69,]	51.25800	104.26683	101.79716	59.79854	81.42696	86.38617	106.64892
##	[70,]	71.15120	72.57892	126.47113	107.07835	103.91725	103.40634	73.88714
##	[71,]	120.88790	72.79061	134.49855	115.06672	123.50099	65.09335	84.52867
##	[72,]	62.42806	85.94666	87.30073	101.12012	89.24148	91.34348	92.86563
##	[73,]	75.19030	129.31191	81.68675	66.12614	81.84285	104.76025	123.02739
##	[74,]	84.99907	106.44241	107.17720	70.97321	80.84087	102.19361	94.65850
##	[75,]	105.16917	78.83365	91.85233	117.95977	117.30623	77.49231	96.35917
##	[76,]	96.89887	62.90005	140.64907	123.07356	130.43934	70.01820	82.62891
##	[77,]	88.52417	86.78042	106.57034	95.00013	81.12520	107.81444	77.81141
##	[78,]	95.29082	96.57274	97.97125	61.20652	60.00305	72.07314	84.25363
##	[79,]	102.83127	55.15846	89.97924	107.71173	88.38108	77.81783	51.88052
##	[80,]	69.36882	106.46746	111.78082	50.91191	49.11540	106.34020	83.65984
##	[81,]	70.00981	92.34499	105.83598	100.06020	97.99841	95.27119	101.92855
##	[82,]	71.58945	89.26380	93.03265	74.83825	70.07176	120.34431	70.08551
##	[83,]	87.13096	66.63665	95.48178	99.09690	88.76177	80.67186	64.17619
##	[84,]	113.75072	88.02034	102.54190	92.74455	84.04853	91.30723	75.26196
##	[85,]	104.00531	28.96687	82.99836	126.52157	104.40768	72.42507	44.01353
##	[86,]	NA	99.93003	78.23057	72.12936	72.95433	103.13016	101.05331
##	[87,]	NA	NA	99.20814	140.04524	115.65004	65.96547	42.03950
##	[88,]	NA	NA	NA	86.59653	73.94763	88.28853	101.48257
##	[89,]	NA	NA	NA	NA	39.02244	117.69352	106.84157
##	[90,]	NA	NA	NA	NA	NA	121.85920	80.50807
##	[91,]	NA	NA	NA	NA	NA	NA	97.92658
##	[92,]	NA	NA	NA	NA	NA	NA	NA
##	[93,]	NA	NA	NA	NA	NA	NA	NA
##	[94,]	NA	NA	NA	NA	NA	NA	NA
##	[95,]	NA	NA	NA	NA	NA	NA	NA
##	[96,]	NA	NA	NA	NA	NA	NA	NA
##	[97,]	NA	NA	NA	NA	NA	NA	NA
##	[98,]	NA	NA	NA	NA	NA	NA	NA
##	[99,]	NA	NA	NA	NA	NA	NA	NA
##	[100,]	NA	NA	NA	NA	NA	NA	NA
##		[,93]	[,94]	[,95]	[,96]	[,97]	[,98]	[,99]
##	[1,]	74.10660	105.48932	45.69325	75.24901	114.81986	106.25030	105.51880
##	[2,]	86.92835	58.23375	88.60820	78.45310	90.19446	99.25227	94.46381
##	[3,]	95.85172	57.43475	97.69407	67.63838	96.23143	85.59857	98.42304
##	[4,]	85.29711	101.71365	73.34972	83.54354	85.34160	103.83357	69.01372
##	[5,]	70.58725	76.83118	101.00191	100.77204	111.35792	96.99153	112.09838
##	[6,]	123.27274	99.53267	114.19866	101.55555	104.25807	65.85917	60.47265
##	[7,]	87.50638	110.26568	109.09747	115.59971	51.96485	76.65562	70.24752
##	[8,]	109.77944	74.41162	100.15821	94.17830	54.00989	70.64658	76.36109
##	[9,]	89.42712	81.57716	64.02680	59.38432	118.02114	93.50756	94.82344
##	[10,]	70.58589	84.85067	124.16249	116.30023	76.16867	86.30297	102.86151
##	[11,]	95.11774	60.13059	92.95175	79.17211	92.03911	82.40723	96.59002
##	[12,]	85.27716	78.49689	94.24592	98.71113	111.81993	91.82364	98.91146
##	[13,]	73.48504	75.92620	90.82504	76.31229	101.73952	104.59535	116.87237
##	[14,]	84.95114	64.08211	88.52506	71.12487	115.81495	65.56988	67.34951
##	[15,]	111.60704	59.98368	98.66070	70.53397	104.29261	81.99531	78.98786
##	[16,]	87.79568	80.52167	103.47865	97.16715	94.38300	61.70966	77.41765
##	[17,]	77.88469	58.72955	70.42230	60.69320	100.21530	128.16865	126.63054
##	[18,]	108.01164	100.03082	80.78551	88.42493	79.39310	94.78043	118.48050

##	[19,]	71.91750	86.32591	72.34982	62.66140	104.98195	98.23984	87.22808
##	[20,]	65.68643	86.46589	107.00618	105.59966	112.04672	92.57896	100.36921
##	[21,]	114.72553	81.10949	120.19644	97.94164	94.66529	68.86520	87.76328
##	[22,]	79.50832	85.00917	90.27583	91.52450	73.34917	98.07266	90.33241
##	[23,]	95.89672	75.69322	119.95750	109.40497	93.73553	73.73336	68.88190
##	[24,]	93.65755	83.30898	79.38228	83.03398	96.20977	93.97726	70.35964
##	[25,]	122.80370	100.44097	94.53150	89.82040	82.82700	59.18769	87.00049
##	[26,]	95.92978	72.73081	81.14055	72.34534	93.18885	75.80848	96.33244
##	[27,]	91.16472	119.07097	76.96255	94.84181	97.05153	103.10849	108.77796
##	[28,]	102.38639	55.21617	115.99911	86.00393	52.03314	83.33300	70.58535
##	[29,]	61.42506	112.31124	51.86748	80.53591	103.70711	105.64517	90.93299
##	[30,]	108.47854	70.80778	112.45191	76.69873	98.13838	105.72209	65.31159
##	[31,]	71.67818	71.72199	57.90167	46.98512	128.37595	98.20990	91.41009
##	[32,]	109.59479	112.90071	68.72263	86.63726	74.17373	103.83418	83.28284
##	[33,]	57.42251	97.81233	78.93919	94.25822	77.39461	64.06068	76.02114
##	[34,]	60.03981	105.04784	80.09169	104.87060	69.74850	87.94661	65.32806
##	[35,]	74.30421	101.26580	53.84736	75.88196	104.43175	89.63730	126.24460
##	[36,]	70.52744	93.92210	118.06864	130.66278	70.87397	71.72517	94.48774
##	[37,]	117.99980	68.06840	93.13667	69.19726	80.22603	110.80805	102.85005
##	[38,]	69.29973	109.54664	77.89634	90.59937	103.49559	72.74538	81.80798
##	[39,]	88.43548	78.56025	119.57893	100.56564	66.99336	81.76469	74.36550
##	[40,]	72.77714	76.82801	81.35728	91.98254	85.20369	74.61788	110.43811
##	[41,]	115.12628	84.13212	79.97868	78.25578	62.04848	94.13402	79.75646
##	[42,]	87.36068	69.66606	80.39655	85.69659	75.13563	83.02111	87.72941
##	[43,]	80.36905	67.57462	96.20840	96.21877	80.44444	95.77836	101.02257
##	[44,]	82.21916	88.35542	67.45362	67.55709	105.83394	125.24571	87.89819
##	[45,]	92.88937	71.29881	68.43744	67.54857	103.03885	69.86232	102.50987
##	[46,]	75.12709	133.92872	80.32056	109.19443	101.05517	83.86157	87.93411
##	[47,]	71.08774	112.52713	57.29263	93.42204	100.13368	74.99856	77.66871
##	[48,]	111.54820	76.47720	92.18162	87.13217	63.47372	86.67755	61.67624
##	[49,]	97.40218	103.54501	70.79435	76.01100	102.38529	93.82307	112.32447
##	[50,]	81.61297	109.36101	102.08209	131.43448	68.53059	52.60307	92.08806
##	[51,]	105.47848	124.88151	84.62554	102.76051	81.10538	57.70967	52.91578
##	[52,]	124.84278	69.32485	89.92922	69.44213	73.93128	70.95209	72.75202
##	[53,]	96.57234	70.15712	91.00608	80.20894	77.68323	95.86707	122.12885
##	[54,]	91.59275	82.23819	66.03395	59.22393	157.89315	87.85257	106.02776
##	[55,]	77.83757	90.88669	111.66634	94.97547	83.47897	109.19028	96.07762
##	[56,]	79.11871	113.12730	91.71212	116.71932	66.68135	104.24613	84.34580
##	[57,]	97.30836	91.88570	52.74581	62.86427	102.83670	99.65864	128.29891
##	[58,]	99.24211	63.27635	113.45854	79.58249	103.11023	95.04020	99.07342
##	[59,]	99.08682	102.27219	77.66165	80.50229	70.51790	84.97445	45.45198
##	[60,]	88.33911	104.93947	78.60400	89.66270	105.79780	56.15151	81.63350
##	[61,]	70.08308	85.64377	97.93128	100.16223	83.04690	78.23970	92.02801
##	[62,]	112.43627	84.43756	103.39609	86.34029	102.04515	112.88502	112.06487
##	[63,]	103.48845	104.90541	105.49392	103.86375	113.68313	82.19549	87.83845
##	[64,]	116.30160	77.97440	131.61049	106.14336	104.55587	77.19539	73.71051
##	[65,]	83.05863	125.47735	85.68675	117.25468	90.17653	54.06704	64.68236
##	[66,]	71.12198	78.04547	93.56130	86.18450	91.38048	108.93320	120.22783
##	[67,]	94.82181	85.00303	103.83947	96.30088	102.02233	39.84816	63.54408
##	[68,]	97.19743	142.91258	72.10962	93.49043	99.43526	107.66566	98.26117
##	[69,]	117.38580	74.87941	69.81405	54.01206	113.63490	79.00017	65.07557
##	[70,]	112.82426	55.22377	105.83104	83.70341	70.52922	65.50057	85.79638
##	[71,]	68.95290	79.75848	105.29887	97.16483	72.11462	104.62040	101.36037
##	[72,]	126.37342	95.82315	111.52961	110.68936	86.01848	35.88695	71.95067

```

## [73,] 76.77719 95.78284 36.14327 52.60806 111.94618 114.03673 134.13747
## [74,] 77.48651 79.95250 91.23660 89.75898 95.50486 60.43563 82.13587
## [75,] 107.03875 116.10382 114.39973 124.81313 55.01177 61.46889 53.23534
## [76,] 101.92425 69.36769 114.25745 87.49824 69.07063 94.75633 86.13978
## [77,] 81.02897 82.91881 89.15192 91.81178 75.69001 98.88906 100.18895
## [78,] 69.39382 88.64356 80.12342 89.99460 118.05525 94.64366 79.27758
## [79,] 86.57843 66.14969 127.20088 97.48467 103.53724 105.14416 103.66762
## [80,] 85.60883 71.11613 78.60455 73.38443 114.88662 73.46922 71.58084
## [81,] 121.75887 96.83623 104.57683 95.03886 80.77469 58.87318 64.76364
## [82,] 96.99114 48.98137 83.12018 47.23714 116.42021 102.89215 105.38992
## [83,] 93.11584 71.92411 113.91479 115.95039 79.65523 58.74793 82.91058
## [84,] 55.00851 82.77181 106.41511 107.23393 94.04827 84.63210 108.78817
## [85,] 103.52906 74.38899 131.76778 115.32977 66.88083 98.03093 80.46576
## [86,] 137.37225 74.31518 76.07683 58.24561 117.15286 77.21283 91.97939
## [87,] 108.11055 63.32046 145.99896 113.34830 65.31082 96.53391 87.26539
## [88,] 99.14298 120.34889 83.09782 103.69231 108.40064 89.79583 107.97467
## [89,] 73.87886 88.35773 43.02600 53.57778 131.19937 88.24985 82.10773
## [90,] 77.03421 82.34142 68.63111 73.29301 134.67261 84.42991 91.10242
## [91,] 97.91367 107.37886 109.52215 114.07020 87.13494 101.98305 89.35309
## [92,] 87.32527 46.17287 128.51186 101.30954 81.01526 92.15197 87.71530
## [93,] NA 99.38443 73.27084 97.42527 88.04286 106.65053 103.44752
## [94,] NA NA 103.16748 63.00456 93.31094 94.30248 90.13730
## [95,] NA NA NA 50.29732 111.63184 107.90860 103.89551
## [96,] NA NA NA NA 117.35210 111.31346 95.95925
## [97,] NA NA NA NA NA 85.57998 77.51524
## [98,] NA NA NA NA NA NA 62.97335
## [99,] NA NA NA NA NA NA NA
## [100,] NA NA NA NA NA NA NA
## [,100]
## [1,] 41.37340
## [2,] 117.53819
## [3,] 121.66252
## [4,] 100.91451
## [5,] 95.25365
## [6,] 95.16299
## [7,] 84.47505
## [8,] 98.30146
## [9,] 57.64726
## [10,] 106.71911
## [11,] 93.90649
## [12,] 79.80621
## [13,] 97.86763
## [14,] 87.87539
## [15,] 121.29610
## [16,] 91.02834
## [17,] 95.95233
## [18,] 75.75578
## [19,] 81.39240
## [20,] 75.58179
## [21,] 116.03235
## [22,] 100.79698
## [23,] 112.44747
## [24,] 86.92298
## [25,] 93.25503

```



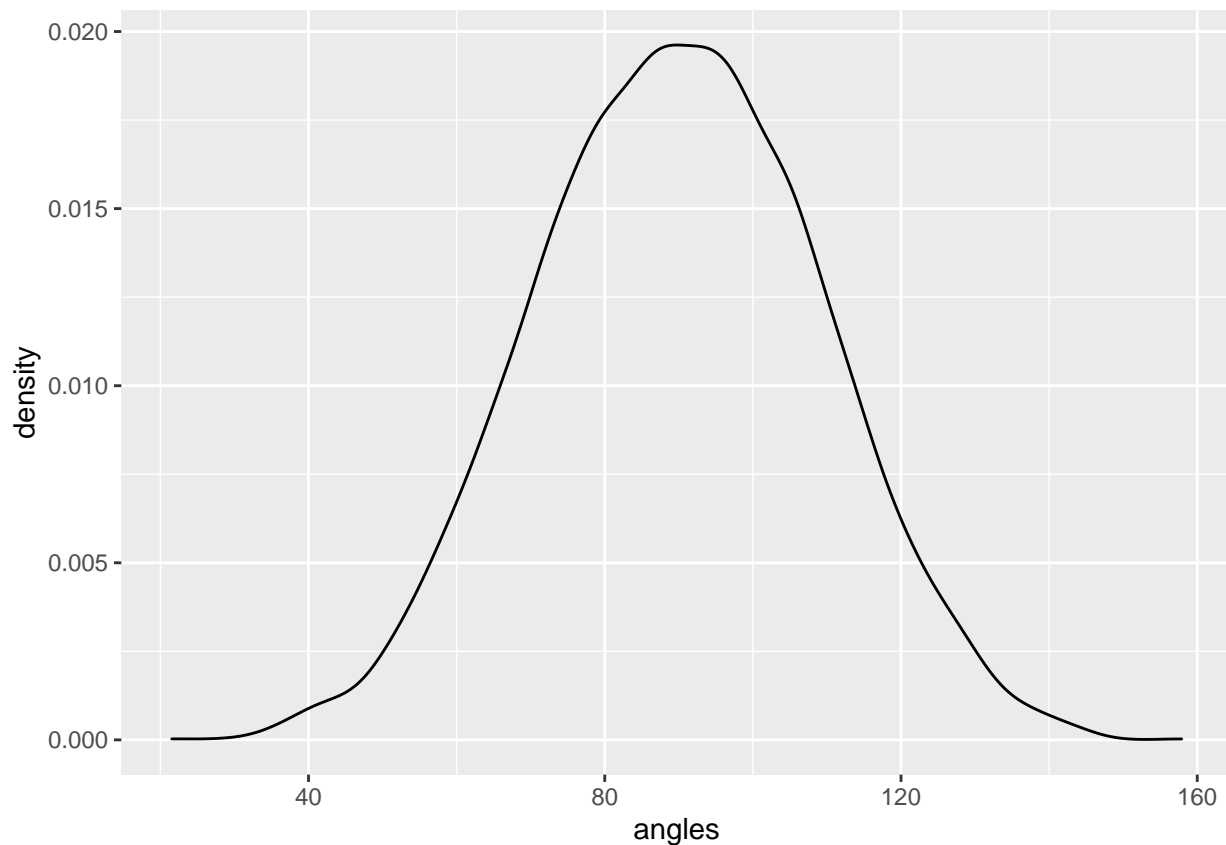
```
## [26,] 112.87091
## [27,] 55.24991
## [28,] 141.26434
## [29,] 75.07985
## [30,] 117.65251
## [31,] 84.48028
## [32,] 82.01545
## [33,] 82.88150
## [34,] 72.50954
## [35,] 54.83681
## [36,] 107.31831
## [37,] 97.56372
## [38,] 54.91510
## [39,] 121.50284
## [40,] 97.20218
## [41,] 93.65894
## [42,] 85.96354
## [43,] 115.74585
## [44,] 103.64640
## [45,] 71.30141
## [46,] 47.35525
## [47,] 50.57218
## [48,] 103.18454
## [49,] 62.00319
## [50,] 87.74946
## [51,] 74.72545
## [52,] 102.79722
## [53,] 96.45217
## [54,] 64.75773
## [55,] 102.95519
## [56,] 91.60708
## [57,] 64.65118
## [58,] 122.30827
## [59,] 83.59224
## [60,] 82.62959
## [61,] 82.78660
## [62,] 84.50027
## [63,] 83.94533
## [64,] 114.45950
## [65,] 65.06410
## [66,] 83.72271
## [67,] 86.06028
## [68,] 62.56155
## [69,] 91.34271
## [70,] 124.35323
## [71,] 120.66618
## [72,] 97.59547
## [73,] 64.47977
## [74,] 100.16772
## [75,] 90.42319
## [76,] 137.05383
## [77,] 113.00002
## [78,] 84.36740
## [79,] 109.30296
```

```
## [80,] 98.57995
## [81,] 108.07978
## [82,] 89.13637
## [83,] 105.64172
## [84,] 99.10465
## [85,] 111.16878
## [86,] 92.61285
## [87,] 133.73024
## [88,] 49.41310
## [89,] 60.95005
## [90,] 64.26975
## [91,] 100.95113
## [92,] 119.04128
## [93,] 72.91321
## [94,] 127.74825
## [95,] 55.51334
## [96,] 89.64537
## [97,] 115.51882
## [98,] 85.71343
## [99,] 101.85334
## [100,] NA
```

Plot the density of these angles.

```
#TO-DO
#TO-DO
pacman:: p_load(ggplot2)
ggplot(data.frame(angles =c(all_angles(X))))+
  aes(x= angles)+
  geom_density()
```

```
## Warning: Removed 5050 rows containing non-finite values (stat_density).
```



angle between 2 random vec on avarage they should be orthogonal

Write an Rcpp function `all_angles_cpp` that does the same thing. Use an IDE if you want, but write it below in-line.

#TO-DO in line rcpp function

```
cppFunction('
NumericMatrix all_angles_cpp(NumericMatrix X) {
  int n = X.nrow();
  int p = X.ncol();
  NumericMatrix A(n, n);
  std::fill(A.begin(), A.end(), NA_REAL);
  for (int i_1 = 0; i_1 < (n - 1); i_1++){
    //Rcout << "computing for row #: " << (i_1 + 1) << "\\n";
    for (int i_2 = i_1 + 1; i_2 < n; i_2++){
      double sum_sqd_u = 0;
      double sum_sqd_v = 0;
      double sum_u_v = 0;

      for (int j = 0; j < p; j++){

        //sqd_diff += pow(X(i_1, j) - X(i_2, j), 2); //by default the cmath library in std is loaded

        sum_sqd_u += pow(X(i_1, j), 2);
        sum_sqd_v += pow(X(i_2, j), 2);
        sum_u_v += X(i_1, j) * X(i_2, j);
      }
    }
  }
  return A;
}
')
```

```

    }
    A(i_1, i_2) = acos(sum_u_v / sqrt(sum_sqd_u * sum_sqd_v)) * (180 / M_PI); //by default the cmati
  }
}
return A;
}
')
head(all_angles_cpp(X))

```

```

##      [,1]      [,2]      [,3]      [,4]      [,5]      [,6]      [,7]      [,8]
## [1,]   NA  92.96163 126.14924  91.33681  81.41249 108.04412 101.50051  89.30027
## [2,]   NA      NA  66.14781  88.90066  78.21263 119.86235 130.65064  85.92698
## [3,]   NA      NA      NA 104.77015  86.03254  96.71089 106.26462  98.34278
## [4,]   NA      NA      NA      NA  96.51874  77.04727 102.32236 111.46164
## [5,]   NA      NA      NA      NA      NA  87.33802 112.38187 112.04775
## [6,]   NA      NA      NA      NA      NA      NA  82.00564 103.00972
##
##      [,9]      [,10]      [,11]      [,12]      [,13]      [,14]      [,15]
## [1,]  56.13061 128.16096  96.33568  63.07440 111.33446  90.36160 120.86324
## [2,]  83.52186  81.97685  63.51225  57.92624  74.79280  73.44154  80.89861
## [3,]  89.44478  61.06160  75.78117 104.52283  43.63118  64.37778  63.78853
## [4,] 121.31606 113.90406 110.05262 106.71648 108.73637 107.72862  65.86154
## [5,] 103.20692  81.40243 106.03555  62.47102  88.65334  82.98753  88.01526
## [6,] 110.09199 101.72663 113.46293 101.75819 111.99458  87.52168  64.08977
##
##      [,16]      [,17]      [,18]      [,19]      [,20]      [,21]      [,22]
## [1,]  99.23899  67.30492  82.90617  92.21570  79.39312 125.05783 108.08541
## [2,] 119.92448  75.33580 110.89758 121.58660  88.20434 103.02694  68.95935
## [3,]  91.65655  88.20636 105.22732  78.42957  89.40283  62.27731  83.43537
## [4,]  87.78692  88.57858  97.81250  79.00961 125.26780  95.22395  77.55021
## [5,]  69.08589  63.80883 113.69746  91.27715  53.86534  68.58181 116.78681
## [6,]  59.05590 116.55986  98.05791  80.46275  93.18601  49.45812 114.07163
##
##      [,23]      [,24]      [,25]      [,26]      [,27]      [,28]      [,29]
## [1,] 100.25705  67.70055 110.63606 115.41352  60.29615 129.80918  69.38425
## [2,]  56.58168  94.38858 119.70312  72.43670  93.14959  85.63976  93.43687
## [3,]  81.19470 127.84397  75.57356  50.51787 106.88566  65.31978 104.98930
## [4,]  96.63428  53.81703  94.64061  72.79703 117.68956  88.46679  38.11183
## [5,]  62.26077  84.45967 104.73476  88.50339 103.02739  97.24426  79.43648
## [6,]  78.41951  74.48668  61.99312  90.04270 107.83458  87.24298  90.27612
##
##      [,30]      [,31]      [,32]      [,33]      [,34]      [,35]      [,36]
## [1,] 111.20300  82.90801  69.44965  98.55994  73.74304  69.80843 123.31421
## [2,]  86.97624  67.81577  88.90540  86.29554  97.01883 102.83419  76.47578
## [3,]  73.78741  61.11909 124.16422  71.83129 130.30815  91.43575  77.23622
## [4,]  87.21083  79.99520  63.97809  92.12547  68.06450  95.82753  88.09594
## [5,]  91.79708  86.09856 123.01233  97.89656 106.08676  96.90609  75.73459
## [6,]  65.81474 102.21706  94.99740 107.60992 102.28214 111.50190  94.61472
##
##      [,37]      [,38]      [,39]      [,40]      [,41]      [,42]      [,43]
## [1,]  85.71328  88.87987 144.57788  92.59273  80.57686  64.36607  95.39872
## [2,]  95.24121 117.68412 104.63905  51.87437  88.97980  63.93323  21.53727
## [3,]  91.80135  93.46660  72.03985  64.91486 111.24698 104.50312  74.74008
## [4,] 111.62249  93.47519  75.46330  99.01045  82.70229 104.85690  89.61710
## [5,] 109.47742 110.22272  99.76969  73.77255 130.78212  93.77550  73.06229
## [6,]  99.67380  86.46539  73.12182 123.28868 101.82004 123.46690 122.27939
##
##      [,44]      [,45]      [,46]      [,47]      [,48]      [,49]      [,50]

```

```

## [1,] 79.94970 67.82696 76.88869 50.70326 83.40976 66.07910 97.60072
## [2,] 64.04633 97.02177 109.18906 88.88024 69.18843 98.41018 82.02021
## [3,] 86.73173 87.95100 116.35391 126.05178 108.79968 84.08194 89.97156
## [4,] 45.97527 109.40123 87.35857 72.43665 83.52017 129.06666 100.71600
## [5,] 76.20836 85.06165 108.58227 95.64211 117.52682 97.74362 79.85530
## [6,] 91.75446 98.77601 87.36461 98.18558 99.58540 104.41210 96.55655
##      [,51]      [,52]      [,53]      [,54]      [,55]      [,56]      [,57]
## [1,] 96.28040 95.39164 86.99857 66.63064 120.46785 73.12799 54.67292
## [2,] 112.37632 87.71696 77.53000 98.47164 114.62260 76.99140 88.45843
## [3,] 110.14031 75.82208 68.55210 80.98278 72.38883 119.72577 88.30409
## [4,] 65.21078 107.99719 136.13056 96.88779 95.32768 76.35538 113.20774
## [5,] 130.27883 115.77677 87.08733 66.63206 88.81302 80.67996 93.95176
## [6,] 63.79206 90.16236 122.31089 75.38750 81.19408 100.81737 116.82594
##      [,58]      [,59]      [,60]      [,61]      [,62]      [,63]      [,64]
## [1,] 126.81117 86.84353 104.69138 83.28171 85.89616 85.65498 109.82154
## [2,] 95.01499 112.98407 87.41001 85.18562 104.48231 105.54867 83.06240
## [3,] 49.22614 113.98617 67.21112 79.10392 99.67253 92.79466 80.88102
## [4,] 92.78485 64.31990 78.59315 132.64871 112.30297 100.34142 95.62673
## [5,] 66.70054 137.73741 95.28994 74.56062 94.69651 59.21990 61.21659
## [6,] 66.81981 78.55979 77.74506 109.20083 83.49021 52.68843 48.04190
##      [,65]      [,66]      [,67]      [,68]      [,69]      [,70]      [,71]
## [1,] 80.11754 90.51814 102.75331 76.51891 75.67960 114.10180 112.18659
## [2,] 87.76240 77.69642 87.32514 122.06117 88.60525 62.38321 83.61566
## [3,] 107.99509 72.23484 67.86783 114.61380 88.85589 52.88848 63.32718
## [4,] 85.99155 131.27303 115.17096 71.37069 72.36853 111.95753 90.59846
## [5,] 98.80936 92.73704 87.67547 108.26048 91.36396 91.50868 60.81835
## [6,] 83.69150 128.53731 74.10459 74.07603 65.60226 99.08473 98.36323
##      [,72]      [,73]      [,74]      [,75]      [,76]      [,77]      [,78]
## [1,] 110.41418 60.68545 114.08593 102.9991 125.18155 106.55911 65.86617
## [2,] 82.49636 92.83018 90.54822 107.8869 79.03979 37.21738 68.29867
## [3,] 79.36427 80.76970 65.31174 108.2137 52.34699 64.27151 101.11633
## [4,] 102.35784 91.78837 75.13896 95.8457 96.60974 84.87289 70.58544
## [5,] 98.24763 89.45079 77.78294 116.2963 81.63898 95.15731 50.91598
## [6,] 66.65454 117.40959 78.14549 72.1343 86.44351 123.81666 84.77727
##      [,79]      [,80]      [,81]      [,82]      [,83]      [,84]      [,85]
## [1,] 112.78636 90.13496 124.25554 85.12431 94.95979 112.93388 97.54438
## [2,] 90.74477 50.07845 80.75850 84.63440 75.05193 85.97629 85.02734
## [3,] 73.01201 68.14990 62.02095 64.74728 97.02559 63.98014 112.51426
## [4,] 107.41239 75.90009 92.50272 120.62137 92.10283 97.45704 98.66752
## [5,] 61.03987 76.88850 115.66502 90.94790 60.05157 55.33888 85.47923
## [6,] 78.25788 89.33371 72.07398 101.40812 82.59217 95.62155 84.94075
##      [,86]      [,87]      [,88]      [,89]      [,90]      [,91]      [,92]
## [1,] 87.55629 117.30465 65.27000 59.49894 65.49559 91.27943 106.23791
## [2,] 78.12841 77.97323 114.69685 84.17390 69.00798 104.86763 61.26024
## [3,] 75.25660 88.63362 127.41933 90.87544 89.27728 108.73543 81.15022
## [4,] 88.65919 100.66546 95.52494 73.71937 94.65139 73.62849 110.54857
## [5,] 100.98971 75.19209 96.53697 91.59301 82.43354 61.26896 72.15026
## [6,] 74.89693 81.73531 79.75560 94.26199 98.77007 59.49791 100.51878
##      [,93]      [,94]      [,95]      [,96]      [,97]      [,98]      [,99]
## [1,] 74.10660 105.48932 45.69325 75.24901 114.81986 106.25030 105.51880
## [2,] 86.92835 58.23375 88.60820 78.45310 90.19446 99.25227 94.46381
## [3,] 95.85172 57.43475 97.69407 67.63838 96.23143 85.59857 98.42304
## [4,] 85.29711 101.71365 73.34972 83.54354 85.34160 103.83357 69.01372
## [5,] 70.58725 76.83118 101.00191 100.77204 111.35792 96.99153 112.09838

```

```
## [6,] 123.27274 99.53267 114.19866 101.55555 104.25807 65.85917 60.47265
##      [,100]
## [1,] 41.37340
## [2,] 117.53819
## [3,] 121.66252
## [4,] 100.91451
## [5,] 95.25365
## [6,] 95.16299
```

Test the time difference between these functions for $n = 1000$ and $Nvec = 100, 500, 1000, 5000$ using the package `microbenchmark`. Store the results in a matrix with rows representing $Nvec$ and two columns for base R and Rcpp.

```
pacman::p_load(microbenchmark)
```

```
n = 1000
```

```
Nvec = c(100,500, 1000, 5000)
```

```
X = matrix(data = rnorm(Nvec*n), nrow = 100)
```

```
timer =microbenchmark(all_angles(X), all_angles_cpp(X), times =10)
```

```
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
## Warning in acos(sum(u * v)/sqrt(sum(u^2) * sum(v^2))): NaNs produced
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

timer

```
## Unit: microseconds
##      expr      min       lq      mean     median       uq
## all_angles(X) 77631.367 114780.43 173283.6292 153068.8115 247354.211
## all_angles_cpp(X) 59.983   70.42   234.1121   102.3785   133.394
```

```
##           max neval
## 268912.437    10
##   1465.035    10
```

#cpp should be faster by 20x

Plot the divergence of performance (in log seconds) over n using a line geometry. Use two different colors for the R and CPP functions. Make sure there's a color legend on your plot. We will see later how to create "long" matrices that make such plots easier.

```
#TO-DO

#pacman::p_load(ggplot2)
#ggplot()+

  #geom_line()+
  #aes(y= Nvec, x= log(timer))
```

Let $Nvec = 10000$ and vary n to be 10, 100, 1000. Plot the density of angles for all three values of n on one plot using color to signify n . Make sure you have a color legend. This is not easy.

```
#TO-DO
#ggplot() +
# geom_line(aes(x = Nvec, y = log(timer), col = "time-R")) +
# geom_line(aes(x = Nvec, y = log(time_cpp), col = "time-Rcpp")) +
# xlab("Number of Columns") +
# ylab("Time in seconds")

#Nvec = 10000
#X <- c()
#for (i in 1:10){
#  x <- rnorm(Nvec)
#  X <- cbind(X, x)
#}
###r (i in 1:100){
#  x <- rnorm(Nvec)
#  X <- cbind(X, x)
#}
#ang2 <- all_angles(X)
#X <- c()
#for (i in 1:1000){
#  x <- rnorm(Nvec)
#  X <- cbind(X, x)
#}
#ang3 <- all_angles(X)

#ggplot() +
# geom_density(aes(x = ang1, fill = "red"), alpha = .4) +
#geom_density(aes(x = ang2, fill = "blue"), alpha = .4) +
#geom_density(aes(x = ang3, fill = "green"), alpha = .4) +
#scale_fill_discrete(labels = c("n=10", "n=100", "n=1000"))
```

Write an R function `nth_fibonnaci` that finds the n th Fibonnaci number via recursion but allows you to

specify the starting number. For instance, if the sequence started at 1, you get the familiar 1, 1, 2, 3, 5, etc. But if it started at 0.01, you would get 0.01, 0.01, 0.02, 0.03, 0.05, etc.

```
#TO-DO
cppFunction("
  double nth_fibonnaci_cpp(int n, double start){
    if (n-1 <= 1)
      return start;
    return nth_fibonnaci_cpp(n-1, start) + nth_fibonnaci_cpp(n-2, start);
  }
  ")
```

Write an Rcpp function `nth_fibonnaci_cpp` that does the same thing. Use an IDE if you want, but write it below in-line.

```
#TO-DO
nth_fibonacci <- function(n, start){
  if (n == 1 | n == 2) return(start)
  else return(nth_fibonacci(n-1, start) + nth_fibonacci(n-2, start))
}
nth_fibonacci(8, 1)
```

```
## [1] 21
```

```
cppFunction(
  'double nth_fibonacci_cpp(int n, double start){
    if (n == 1 || n == 2) return start;
    else return (nth_fibonacci_cpp(n-1, start) + nth_fibonacci_cpp(n-2, start));
  }'
)
nth_fibonacci_cpp(5, 1)
```

```
## [1] 5
```

Time the difference in these functions for $n = 100, 200, \dots, 1500$ while starting the sequence at the smallest possible floating point value in R. Store the results in a matrix.

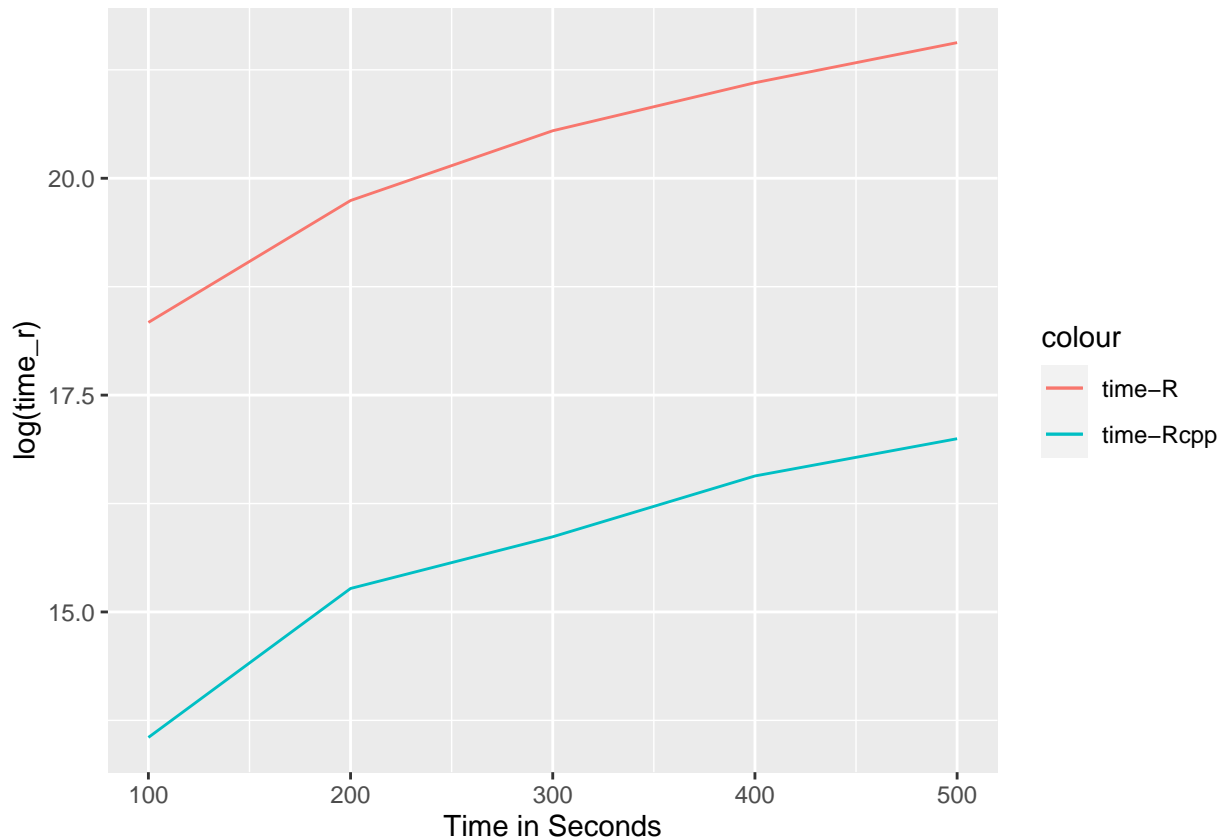
```
#TO-DO

pacman::p_load(microbenchmark)

n <- 100
Nvec <- c(100, 200, 300, 400, 500)
time_r <- c()
time_cpp <- c()
for (i in 1:length(Nvec)){
  X <- c()
  for (j in 1:n){
    x <- rnorm(Nvec[i])
    X <- cbind(X, x)
  }
  time_r <- c(time_r, mean(microbenchmark(angles_r = all_angles(X), times = 3, unit = "s")$time))
  time_cpp <- c(time_cpp, mean(microbenchmark(angles_cpp = all_angles_cpp(X), times = 3, unit = "s")$time))
}
```

Plot the divergence of performance (in log seconds) over n using a line geometry. Use two different colors for the R and CPP functions. Make sure there's a color legend on your plot.

```
pacman::p_load(ggplot2)
ggplot() +
  geom_line(aes(x = Nvec, y = log(time_r), col = "time-R")) +
  geom_line(aes(x = Nvec, y = log(time_cpp), col = "time-Rcpp")) +
  xlab("Time in Seconds")
```



Data Wrangling / Munging / Carpentry

Throughout this assignment you can use either the **tidyverse** package suite or **data.table** to answer but not base R. You can mix **data.table** with **magrittr** piping if you wish but don't go back and forth between **tbl_df**'s and **data.table** objects.

```
#pacman::p_load(tidyverse, magrittr, data.table)
pacman::p_load(dplyr, magrittr, data.table)
```

Load the **storms** dataset from the **dplyr** package and investigate it using **str** and **summary** and **head**. Which two columns should be converted to type factor? Do so below.

```
#TO-DO
data(storms)
str(storms)
```



```
## tibble[,13] [10,010 x 13] (S3: tbl_df/tbl/data.frame)
## $ name      : chr [1:10010] "Amy" "Amy" "Amy" "Amy" ...
## $ year      : num [1:10010] 1975 1975 1975 1975 1975 ...
## $ month     : num [1:10010] 6 6 6 6 6 6 6 6 6 6 ...
## $ day       : int [1:10010] 27 27 27 27 28 28 28 28 29 29 ...
## $ hour      : num [1:10010] 0 6 12 18 0 6 12 18 0 6 ...
## $ lat       : num [1:10010] 27.5 28.5 29.5 30.5 31.5 32.4 33.3 34 34.4 34 ...
## $ long      : num [1:10010] -79 -79 -79 -79 -78.8 -78.7 -78 -77 -75.8 -74.8 ...
## $ status    : chr [1:10010] "tropical depression" "tropical depression" "tropical depression" "tropical depression" ...
## $ category   : Ord.factor w/ 7 levels "-1"<"0"<"1"<"2"<...: 1 1 1 1 1 1 1 1 1 2 2 ...
## $ wind      : int [1:10010] 25 25 25 25 25 25 25 30 35 40 ...
## $ pressure   : int [1:10010] 1013 1013 1013 1013 1012 1012 1011 1006 1004 1002 ...
## $ ts_diameter: num [1:10010] NA NA NA NA NA NA NA NA NA NA ...
## $ hu_diameter: num [1:10010] NA NA NA NA NA NA NA NA NA NA ...
```

```
head(storms)
```

```
## # A tibble: 6 x 13
##   name   year month   day hour   lat long status      category wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>      <ord>    <int>    <int>
## 1 Amy    1975     6    27     0  27.5 -79 tropical de~ -1         25     1013
## 2 Amy    1975     6    27     6  28.5 -79 tropical de~ -1         25     1013
## 3 Amy    1975     6    27    12  29.5 -79 tropical de~ -1         25     1013
## 4 Amy    1975     6    27    18  30.5 -79 tropical de~ -1         25     1013
## 5 Amy    1975     6    28     0  31.5 -78.8 tropical de~ -1         25     1012
## 6 Amy    1975     6    28     6  32.4 -78.7 tropical de~ -1         25     1012
## # ... with 2 more variables: ts_diameter <dbl>, hu_diameter <dbl>
```

```
#category = how bad the storm is
```

Reorder the columns so name is first, status is second, category is third and the rest are the same.

```
storms%>%
  select(name, status, category, everything())
```

```
## # A tibble: 10,010 x 13
##   name status      category year month   day hour   lat long wind pressure
##   <chr> <chr>      <ord>    <dbl> <dbl> <int> <dbl> <dbl> <dbl> <int>    <int>
## 1 Amy tropical d~ -1      1975     6    27     0  27.5 -79     25     1013
## 2 Amy tropical d~ -1      1975     6    27     6  28.5 -79     25     1013
## 3 Amy tropical d~ -1      1975     6    27    12  29.5 -79     25     1013
## 4 Amy tropical d~ -1      1975     6    27    18  30.5 -79     25     1013
## 5 Amy tropical d~ -1      1975     6    28     0  31.5 -78.8    25     1012
## 6 Amy tropical d~ -1      1975     6    28     6  32.4 -78.7    25     1012
## 7 Amy tropical d~ -1      1975     6    28    12  33.3 -78     25     1011
## 8 Amy tropical d~ -1      1975     6    28    18  34    -77     30     1006
## 9 Amy tropical s~ 0       1975     6    29     0  34.4 -75.8    35     1004
## 10 Amy tropical s~ 0       1975     6    29     6  34    -74.8    40     1002
## # ... with 10,000 more rows, and 2 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>
```

Find a subset of the data of storms only in the 1970's.

```
#TO-DO
```

```
storms%>%  
  filter(year>= 1970 & year <= 1979)
```

```
## # A tibble: 546 x 13  
##   name year month day hour lat long status category wind pressure  
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord> <int> <int>  
## 1 Amy 1975 6 27 0 27.5 -79 tropical d- -1 25 1013  
## 2 Amy 1975 6 27 6 28.5 -79 tropical d- -1 25 1013  
## 3 Amy 1975 6 27 12 29.5 -79 tropical d- -1 25 1013  
## 4 Amy 1975 6 27 18 30.5 -79 tropical d- -1 25 1013  
## 5 Amy 1975 6 28 0 31.5 -78.8 tropical d- -1 25 1012  
## 6 Amy 1975 6 28 6 32.4 -78.7 tropical d- -1 25 1012  
## 7 Amy 1975 6 28 12 33.3 -78 tropical d- -1 25 1011  
## 8 Amy 1975 6 28 18 34 -77 tropical d- -1 30 1006  
## 9 Amy 1975 6 29 0 34.4 -75.8 tropical s- 0 35 1004  
## 10 Amy 1975 6 29 6 34 -74.8 tropical s- 0 40 1002  
## # ... with 536 more rows, and 2 more variables: ts_diameter <dbl>,  
## # hu_diameter <dbl>
```

Find a subset of the data of storm observations only with category 4 and above and wind speed 100MPH and above.

```
#TO-DO
```

```
storms%>%  
  filter(category >= 4 & wind >= 100)
```

```
## # A tibble: 416 x 13  
##   name year month day hour lat long status category wind pressure  
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord> <int> <int>  
## 1 Anita 1977 9 2 0 24.6 -96.2 hurricane 5 140 931  
## 2 Anita 1977 9 2 6 24.2 -97.1 hurricane 5 150 926  
## 3 Anita 1977 9 2 12 23.7 -98 hurricane 4 120 940  
## 4 David 1979 8 28 0 12.2 -52.9 hurricane 4 115 947  
## 5 David 1979 8 28 6 12.5 -54.4 hurricane 4 125 941  
## 6 David 1979 8 28 12 12.8 -55.7 hurricane 4 130 938  
## 7 David 1979 8 28 18 13.2 -56.9 hurricane 4 125 941  
## 8 David 1979 8 29 0 13.7 -58 hurricane 4 120 944  
## 9 David 1979 8 29 6 14.2 -59.2 hurricane 4 120 942  
## 10 David 1979 8 29 12 14.8 -60.3 hurricane 4 125 938  
## # ... with 406 more rows, and 2 more variables: ts_diameter <dbl>,  
## # hu_diameter <dbl>
```

Create a new feature wind_speed_per_unit_pressure.

```
#TO-DO
```

```
storms%>%  
  mutate(wind_speed_per_unit_pressure = wind/pressure)
```

```
## # A tibble: 10,010 x 14
```

```
##   name   year month   day  hour   lat   long status   category  wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>      <ord>    <int>    <int>
## 1 Amy    1975     6    27     0  27.5 -79   tropical d~ -1      25     1013
## 2 Amy    1975     6    27     6  28.5 -79   tropical d~ -1      25     1013
## 3 Amy    1975     6    27    12  29.5 -79   tropical d~ -1      25     1013
## 4 Amy    1975     6    27    18  30.5 -79   tropical d~ -1      25     1013
## 5 Amy    1975     6    28     0  31.5 -78.8 tropical d~ -1      25     1012
## 6 Amy    1975     6    28     6  32.4 -78.7 tropical d~ -1      25     1012
## 7 Amy    1975     6    28    12  33.3 -78   tropical d~ -1      25     1011
## 8 Amy    1975     6    28    18   34   -77   tropical d~ -1      30     1006
## 9 Amy    1975     6    29     0  34.4 -75.8 tropical s~ 0       35     1004
## 10 Amy   1975     6    29     6   34   -74.8 tropical s~ 0       40     1002
## # ... with 10,000 more rows, and 3 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, wind_speed_per_unit_pressure <dbl>
```

Create a new feature: `average_diameter` which averages the two diameter metrics. If one is missing, then use the value of the one that is present. If both are missing, leave missing.

```
storms%>%
  rowwise()%>%
  arrange(desc(year))%>%
  mutate(average_diameter = mean(c(ts_diameter, hu_diameter) , na.rm =TRUE) )
```

```
## # A tibble: 10,010 x 14
## # Rowwise:
##   name   year month   day  hour   lat   long status   category  wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>      <ord>    <int>    <int>
## 1 Ana    2015     5     9     6  32.2 -77.5 tropical s~ 0       50     998
## 2 Ana    2015     5     9    12  32.5 -77.8 tropical s~ 0       50    1001
## 3 Ana    2015     5     9    18  32.7 -78   tropical s~ 0       45    1001
## 4 Ana    2015     5    10     0  33.1 -78.3 tropical s~ 0       45    1001
## 5 Ana    2015     5    10     6  33.5 -78.6 tropical s~ 0       40    1002
## 6 Ana    2015     5    10    10  33.8 -78.8 tropical s~ 0       40    1002
## 7 Ana    2015     5    10    12  33.9 -78.8 tropical s~ 0       35    1002
## 8 Ana    2015     5    10    18  34.3 -78.7 tropical d~ -1      30    1006
## 9 Ana    2015     5    11     0  34.7 -78.5 tropical d~ -1      30    1009
## 10 Ana   2015     5    11     6  35.5 -78   tropical d~ -1      30    1010
## # ... with 10,000 more rows, and 3 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, average_diameter <dbl>
```

```
#we need a vector mean function
#the mean function does the entire matrix and not row by row

#hw
```

For each storm, summarize the maximum wind speed. “Summarize” means create a new dataframe with only the summary metrics you care about.

```
#TO-DO
storms%>%
  group_by(name)%>%
  summarise(max_wind_speed = max(wind, na.rm= TRUE))
```

```
## # A tibble: 198 x 2
##   name      max_wind_speed
##   <chr>          <int>
## 1 AL011993         30
## 2 AL012000         25
## 3 AL021992         30
## 4 AL021994         30
## 5 AL021999         30
## 6 AL022000         30
## 7 AL022001         25
## 8 AL022003         30
## 9 AL022006         45
## 10 AL031987        40
## # ... with 188 more rows
```

Order your dataset by maximum wind speed storm but within the rows of storm show the observations in time order from early to late.

```
#TO-DO
storms%>%
  group_by(name)%>%
    mutate(max_wind_storm =max(wind, na.rm = TRUE))%>%
    select(name, max_wind_storm, everything())%>%
    arrange(max_wind_storm, year, day, hour)
```

```
## # A tibble: 10,010 x 14
## # Groups:   name [198]
##   name      max_wind_storm year month   day hour   lat long status   category
##   <chr>          <int> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>      <ord>
## 1 AL101~         25  1991    10    24   12  13.4 -42.3 tropical ~ -1
## 2 AL101~         25  1991    10    24   18  13.7 -43.6 tropical ~ -1
## 3 AL101~         25  1991    10    25    0  13.8 -44.9 tropical ~ -1
## 4 AL101~         25  1991    10    25    6   14  -46.4 tropical ~ -1
## 5 AL101~         25  1991    10    25   12  14.1 -47.7 tropical ~ -1
## 6 AL012~         25  2000     6     7   18   21  -93  tropical ~ -1
## 7 AL012~         25  2000     6     8    0  20.9 -92.8 tropical ~ -1
## 8 AL012~         25  2000     6     8    6  20.7 -93.1 tropical ~ -1
## 9 AL012~         25  2000     6     8   12  20.8 -93.5 tropical ~ -1
## 10 AL022~         25  2001     7    11   18  10.9 -42.1 tropical ~ -1
## # ... with 10,000 more rows, and 4 more variables: wind <int>, pressure <int>,
## #   ts_diameter <dbl>, hu_diameter <dbl>
```

Find the strongest storm by wind speed per year.

```
#TO-DO
storms%>%
  group_by(year)%>%
    arrange(desc(wind))%>%
    slice(1)%>% #wil give us the first row
    select(name,year)
```

```
## # A tibble: 41 x 2
```

```
## # Groups:   year [41]
##   name      year
##   <chr>     <dbl>
## 1 Caroline  1975
## 2 Belle     1976
## 3 Anita     1977
## 4 Cora      1978
## 5 David     1979
## 6 Ivan      1980
## 7 Harvey    1981
## 8 Debby     1982
## 9 Alicia    1983
## 10 Diana    1984
## # ... with 31 more rows
```

For each named storm, find its maximum category, wind speed, pressure and diameters. Do not allow the max to be NA (unless all the measurements for that storm were NA).

#TO-DO

```
storms%>%
  group_by(name)%>%
    mutate(max_pressure = max(pressure, na.rm = TRUE))%>%
    mutate(max_wind_speed = max(wind, na.rm = TRUE))%>%
    mutate( max_ts_diameter = max(ts_diameter, na.rm = TRUE))%>%
    mutate(max_hu_diameter = max(hu_diameter, na.rm = TRUE))%>%

  select(max_pressure, max_wind_speed, max_ts_diameter,max_hu_diameter )%>%
  #arrange(name)
  distinct
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```

```
## Warning in max(ts_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf
```



```

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Warning in max(hu_diameter, na.rm = TRUE): no non-missing arguments to max;
## returning -Inf

## Adding missing grouping variables: 'name'

## # A tibble: 198 x 5
## # Groups:   name [198]
##   name      max_pressure max_wind_speed max_ts_diameter max_hu_diameter

```

```
##      <chr>          <int>      <int>      <dbl>      <dbl>
## 1 Amy              1013         60      -Inf      -Inf
## 2 Caroline         1014        100      -Inf      -Inf
## 3 Doris            1005         95      -Inf      -Inf
## 4 Belle            1012        105      -Inf      -Inf
## 5 Gloria           1009        125      -Inf      -Inf
## 6 Anita            1012        150      -Inf      -Inf
## 7 Clara            1015         65      -Inf      -Inf
## 8 Evelyn           1010         70      -Inf      -Inf
## 9 Amelia           1010         45      -Inf      -Inf
## 10 Bess             1012         45      -Inf      -Inf
## # ... with 188 more rows
```

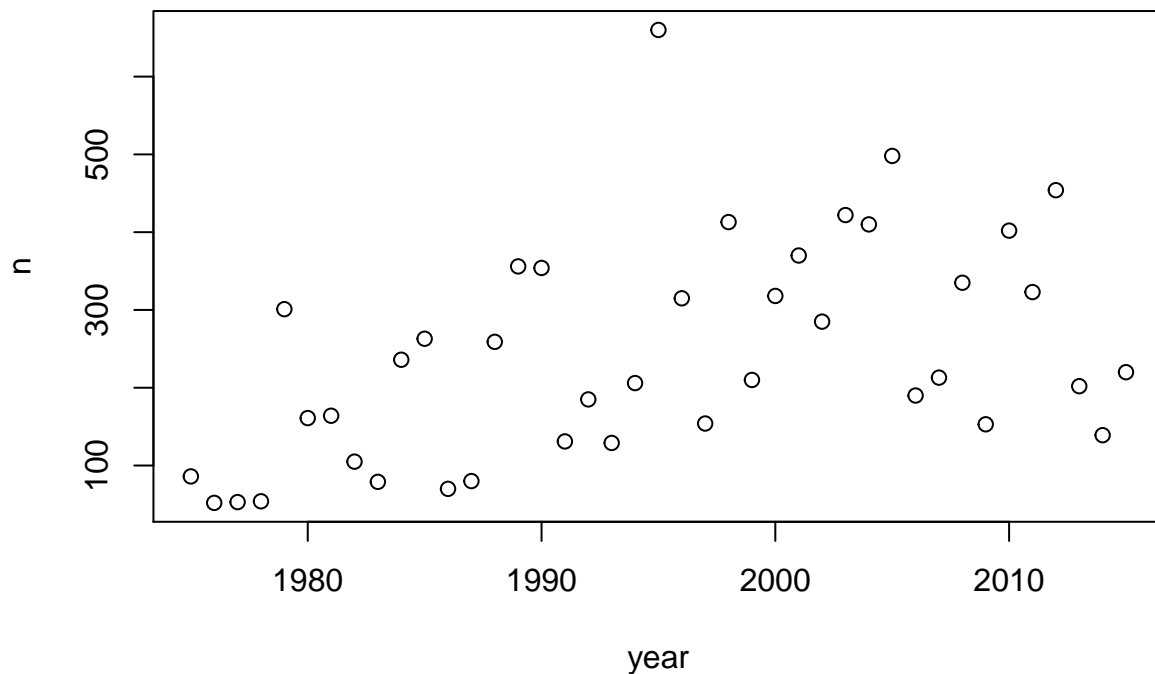
```
# summarise(max_wind_speed = max(wind, na.rm= TRUE))

data(storms)
```

For each year in the dataset, tally the number of storms. “Tally” is a fancy word for “count the number of”. Plot the number of storms by year. Any pattern?

```
#TO-DO

storms%>%
  group_by(year)%>%
  tally()%>%
  plot
```



```
#the number of stomers per year seems to increase and the storms also seem to be seasonal
```

For each year in the dataset, tally the storms by category.

```
storms%>%
  group_by(year, category)%>%
  summarise(tally = n())
```

'summarise()' has grouped output by 'year'. You can override using the '.groups' argument.

```
## # A tibble: 233 x 3
## # Groups:   year [41]
##   year category tally
##   <dbl> <ord>   <int>
## 1  1975 -1         30
## 2  1975 0         33
## 3  1975 1         12
## 4  1975 2          9
## 5  1975 3          2
## 6  1976 -1        10
## 7  1976 0        20
## 8  1976 1        10
## 9  1976 2          9
## 10 1976 3          3
## # ... with 223 more rows
```

For each year in the dataset, find the maximum wind speed per status level.

```
storms%>%
  group_by(year, status)%>%
  summarise(max_wind_speed = max(wind))
```

'summarise()' has grouped output by 'year'. You can override using the '.groups' argument.

```
## # A tibble: 123 x 3
## # Groups:   year [41]
##   year status          max_wind_speed
##   <dbl> <chr>              <int>
## 1  1975 hurricane         100
## 2  1975 tropical depression    30
## 3  1975 tropical storm        60
## 4  1976 hurricane        105
## 5  1976 tropical depression    30
## 6  1976 tropical storm        60
## 7  1977 hurricane        150
## 8  1977 tropical depression    30
## 9  1977 tropical storm        60
## 10 1978 hurricane         80
## # ... with 113 more rows
```

For each storm, summarize its average location in latitude / longitude coordinates.

#TO-DO

```
storms%>%
  group_by(name)%>%
  summarize(average_latitude = mean(lat), avrage_longitude = mean(long))
```

```
## # A tibble: 198 x 3
##   name      average_latitude avrage_longitude
##   <chr>          <dbl>          <dbl>
## 1 AL011993      24.7            -78.0
## 2 AL012000      20.8            -93.1
## 3 AL021992      26.7            -84.5
## 4 AL021994      33.6            -79.7
## 5 AL021999      20.4            -96.4
## 6 AL022000       9.9            -28.5
## 7 AL022001      11.9            -45.3
## 8 AL022003       9.62           -43.4
## 9 AL022006      41.3            -63.5
## 10 AL031987     30.8            -88.7
## # ... with 188 more rows
```

For each storm, summarize its duration in number of hours (to the nearest 6hr increment).

#TO-DO

```
storms%>%
  group_by(name)%>%

  #summarise(neareast_6hr_increment = round((hour)/6)) nope
  mutate(duration = (n()-1)*6)%>%
  select(name, duration)%>%
  distinct
```

```
## # A tibble: 198 x 2
## # Groups:   name [198]
##   name      duration
##   <chr>          <dbl>
## 1 Amy           174
## 2 Caroline      192
## 3 Doris         132
## 4 Belle         102
## 5 Gloria        744
## 6 Anita         114
## 7 Clara         138
## 8 Evelyn         48
## 9 Amelia         30
## 10 Bess          72
## # ... with 188 more rows
```

For storm in a category, create a variable `storm_number` that enumerates the storms 1, 2, ... (in date order).

#TO-DO

```
storms%>%
```

```
group_by(name)%>%
mutate(storm_number =dense_rank(paste(year,month,day)))
```

```
## # A tibble: 10,010 x 14
## # Groups:   name [198]
##   name year month day hour lat long status category wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord> <int> <int>
## 1 Amy 1975 6 27 0 27.5 -79 tropical d~ -1 25 1013
## 2 Amy 1975 6 27 6 28.5 -79 tropical d~ -1 25 1013
## 3 Amy 1975 6 27 12 29.5 -79 tropical d~ -1 25 1013
## 4 Amy 1975 6 27 18 30.5 -79 tropical d~ -1 25 1013
## 5 Amy 1975 6 28 0 31.5 -78.8 tropical d~ -1 25 1012
## 6 Amy 1975 6 28 6 32.4 -78.7 tropical d~ -1 25 1012
## 7 Amy 1975 6 28 12 33.3 -78 tropical d~ -1 25 1011
## 8 Amy 1975 6 28 18 34 -77 tropical d~ -1 30 1006
## 9 Amy 1975 6 29 0 34.4 -75.8 tropical s~ 0 35 1004
## 10 Amy 1975 6 29 6 34 -74.8 tropical s~ 0 40 1002
## # ... with 10,000 more rows, and 3 more variables: ts_diameter <dbl>,
## # hu_diameter <dbl>, storm_number <int>
```

Convert year, month, day, hour into the variable `timestamp` using the `lubridate` package. Although the new package `clock` just came out, `lubridate` still seems to be standard. Next year I'll probably switch the class to be using `clock`.

```
#TO-DO
pacman::p_load(lubridate)
storms%>%
  mutate(timestamp =make_datetime(year, month, day, hour))%>%
  select(timestamp, everything())
```

```
## # A tibble: 10,010 x 14
##   timestamp name year month day hour lat long status category
##   <dtm> <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord>
## 1 1975-06-27 00:00:00 Amy 1975 6 27 0 27.5 -79 tropi~ -1
## 2 1975-06-27 06:00:00 Amy 1975 6 27 6 28.5 -79 tropi~ -1
## 3 1975-06-27 12:00:00 Amy 1975 6 27 12 29.5 -79 tropi~ -1
## 4 1975-06-27 18:00:00 Amy 1975 6 27 18 30.5 -79 tropi~ -1
## 5 1975-06-28 00:00:00 Amy 1975 6 28 0 31.5 -78.8 tropi~ -1
## 6 1975-06-28 06:00:00 Amy 1975 6 28 6 32.4 -78.7 tropi~ -1
## 7 1975-06-28 12:00:00 Amy 1975 6 28 12 33.3 -78 tropi~ -1
## 8 1975-06-28 18:00:00 Amy 1975 6 28 18 34 -77 tropi~ -1
## 9 1975-06-29 00:00:00 Amy 1975 6 29 0 34.4 -75.8 tropi~ 0
## 10 1975-06-29 06:00:00 Amy 1975 6 29 6 34 -74.8 tropi~ 0
## # ... with 10,000 more rows, and 4 more variables: wind <int>, pressure <int>,
## # ts_diameter <dbl>, hu_diameter <dbl>
```

Using the `lubridate` package, create new variables `day_of_week` which is a factor with levels “Sunday”, “Monday”, ... “Saturday” and `week_of_year` which is integer 1, 2, ..., 52.

```
#TO-DO
storms %>%
```

```
mutate(timestamp = make_datetime(year, month, day),
       day_of_the_week = wday(ymd(timestamp), label = TRUE, abbr = FALSE),
       week_of_year = week(ymd(timestamp)))
```

```
## # A tibble: 10,010 x 16
##   name year month day hour lat long status category wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>      <ord>    <int>    <int>
## 1 Amy 1975 6 27 0 27.5 -79 tropical d- -1 25 1013
## 2 Amy 1975 6 27 6 28.5 -79 tropical d- -1 25 1013
## 3 Amy 1975 6 27 12 29.5 -79 tropical d- -1 25 1013
## 4 Amy 1975 6 27 18 30.5 -79 tropical d- -1 25 1013
## 5 Amy 1975 6 28 0 31.5 -78.8 tropical d- -1 25 1012
## 6 Amy 1975 6 28 6 32.4 -78.7 tropical d- -1 25 1012
## 7 Amy 1975 6 28 12 33.3 -78 tropical d- -1 25 1011
## 8 Amy 1975 6 28 18 34 -77 tropical d- -1 30 1006
## 9 Amy 1975 6 29 0 34.4 -75.8 tropical s- 0 35 1004
## 10 Amy 1975 6 29 6 34 -74.8 tropical s- 0 40 1002
## # ... with 10,000 more rows, and 5 more variables: ts_diameter <dbl>,
## # hu_diameter <dbl>, timestamp <dtm>, day_of_the_week <ord>,
## # week_of_year <dbl>
```

For each storm, summarize the day in which is started in the following format “Friday, June 27, 1975”.

```
#T0-D0
```

```
storms %>%
  group_by(name) %>%
  arrange(day, hour) %>%
  slice(1) %>%
  mutate(timestamp = make_datetime(year, month, day),
         day_of_the_week = wday(ymd(timestamp), label = TRUE, abbr = FALSE)) %>%
  summarize(start_date = paste(day_of_week, paste(month(month, label = TRUE, abbr = FALSE), day) , year
```

```
## # A tibble: 198 x 2
##   name start_date
##   <chr> <chr>
## 1 AL011993 Tuesday, June 1, 1993
## 2 AL012000 Wednesday, June 7, 2000
## 3 AL021992 Thursday, June 25, 1992
## 4 AL021994 Wednesday, July 20, 1994
## 5 AL021999 Friday, July 2, 1999
## 6 AL022000 Friday, June 23, 2000
## 7 AL022001 Wednesday, July 11, 2001
## 8 AL022003 Wednesday, June 11, 2003
## 9 AL022006 Monday, July 17, 2006
## 10 AL031987 Sunday, August 9, 1987
## # ... with 188 more rows
```

Create a new factor variable `decile_windspeed` by binning wind speed into 10 bins.

```
#TO-DO
x = (1:10)/10
#x=seq(0, 1, by = 0.1)
storms %>%
  mutate(decile_windspeed = cut(wind, quantile(wind, x ), labels =FALSE)) #flase wil bring the binds i
```

```
## # A tibble: 10,010 x 14
##   name year month day hour lat long status category wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord> <int> <int>
## 1 Amy 1975 6 27 0 27.5 -79 tropical d~ -1 25 1013
## 2 Amy 1975 6 27 6 28.5 -79 tropical d~ -1 25 1013
## 3 Amy 1975 6 27 12 29.5 -79 tropical d~ -1 25 1013
## 4 Amy 1975 6 27 18 30.5 -79 tropical d~ -1 25 1013
## 5 Amy 1975 6 28 0 31.5 -78.8 tropical d~ -1 25 1012
## 6 Amy 1975 6 28 6 32.4 -78.7 tropical d~ -1 25 1012
## 7 Amy 1975 6 28 12 33.3 -78 tropical d~ -1 25 1011
## 8 Amy 1975 6 28 18 34 -77 tropical d~ -1 30 1006
## 9 Amy 1975 6 29 0 34.4 -75.8 tropical s~ 0 35 1004
## 10 Amy 1975 6 29 6 34 -74.8 tropical s~ 0 40 1002
## # ... with 10,000 more rows, and 3 more variables: ts_diameter <dbl>,
## # hu_diameter <dbl>, decile_windspeed <int>
```

Create a new data frame `serious_storms` which are category 3 and above hurricanes.

```
#TO-DO
serious_storms = storms%<>%
  filter(category >=3)
serious_storms
```

```
## # A tibble: 779 x 13
##   name year month day hour lat long status category wind pressure
##   <chr> <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr> <ord> <int> <int>
## 1 Caroline 1975 8 31 0 24 -97 hurrica~ 3 100 973
## 2 Caroline 1975 8 31 6 24.1 -97.5 hurrica~ 3 100 963
## 3 Belle 1976 8 8 18 29.5 -75.3 hurrica~ 3 100 958
## 4 Belle 1976 8 9 0 30.9 -75.3 hurrica~ 3 105 957
## 5 Belle 1976 8 9 6 32.5 -75.2 hurrica~ 3 105 959
## 6 Anita 1977 9 1 18 25.2 -95.5 hurrica~ 3 110 945
## 7 Anita 1977 9 2 0 24.6 -96.2 hurrica~ 5 140 931
## 8 Anita 1977 9 2 6 24.2 -97.1 hurrica~ 5 150 926
## 9 Anita 1977 9 2 12 23.7 -98 hurrica~ 4 120 940
## 10 David 1979 8 28 0 12.2 -52.9 hurrica~ 4 115 947
## # ... with 769 more rows, and 2 more variables: ts_diameter <dbl>,
## # hu_diameter <dbl>
```

In `serious_storms`, merge the variables `lat` and `long` together into `lat_long` with values `lat / long` as a string.

```
serious_storms%>%
  mutate(lat_long = paste(lat, long, sep = " / "))
```

```
## # A tibble: 779 x 14
```

```
##   name      year month   day  hour   lat   long status   category  wind pressure
##   <chr>    <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>    <ord>    <int>    <int>
## 1 Caroline 1975     8    31     0  24   -97   hurrica~ 3         100     973
## 2 Caroline 1975     8    31     6  24.1 -97.5   hurrica~ 3         100     963
## 3 Belle    1976     8     8    18  29.5 -75.3   hurrica~ 3         100     958
## 4 Belle    1976     8     9     0  30.9 -75.3   hurrica~ 3         105     957
## 5 Belle    1976     8     9     6  32.5 -75.2   hurrica~ 3         105     959
## 6 Anita    1977     9     1    18  25.2 -95.5   hurrica~ 3         110     945
## 7 Anita    1977     9     2     0  24.6 -96.2   hurrica~ 5         140     931
## 8 Anita    1977     9     2     6  24.2 -97.1   hurrica~ 5         150     926
## 9 Anita    1977     9     2    12  23.7 -98     hurrica~ 4         120     940
## 10 David   1979     8    28     0  12.2 -52.9   hurrica~ 4         115     947
## # ... with 769 more rows, and 3 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, lat_long <chr>
```

Let's return now to the original storms data frame. For each category, find the average wind speed, pressure and diameters (do not count the NA's in your averaging).

```
#TO-DO
storms%>%
group_by(category) %>%

mutate(average_wind_speed = mean(wind), average_pressure = mean(pressure), average_ts_diameter = mean(ts_diameter))
```

```
## # A tibble: 779 x 17
## # Groups:   category [3]
##   name      year month   day  hour   lat   long status   category  wind pressure
##   <chr>    <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>    <ord>    <int>    <int>
## 1 Caroline 1975     8    31     0  24   -97   hurrica~ 3         100     973
## 2 Caroline 1975     8    31     6  24.1 -97.5   hurrica~ 3         100     963
## 3 Belle    1976     8     8    18  29.5 -75.3   hurrica~ 3         100     958
## 4 Belle    1976     8     9     0  30.9 -75.3   hurrica~ 3         105     957
## 5 Belle    1976     8     9     6  32.5 -75.2   hurrica~ 3         105     959
## 6 Anita    1977     9     1    18  25.2 -95.5   hurrica~ 3         110     945
## 7 Anita    1977     9     2     0  24.6 -96.2   hurrica~ 5         140     931
## 8 Anita    1977     9     2     6  24.2 -97.1   hurrica~ 5         150     926
## 9 Anita    1977     9     2    12  23.7 -98     hurrica~ 4         120     940
## 10 David   1979     8    28     0  12.2 -52.9   hurrica~ 4         115     947
## # ... with 769 more rows, and 6 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, average_wind_speed <dbl>, average_pressure <dbl>,
## #   average_ts_diameter <dbl>, avg_hu_diam <dbl>
```

For each named storm, find its maximum category, wind speed, pressure and diameters (do not allow the max to be NA) and the number of readings (i.e. observations).

```
#TO-DO
storms%>%
group_by(name) %>%
  filter(!is.na(ts_diameter), !is.na(hu_diameter))%>%
  summarise(max_category = max(category), max_wind_speed = max(wind), max_pressure = max(pressure), max_ts_diameter = max(ts_diameter), max_hu_diameter = max(hu_diameter))
```

```
## # A tibble: 32 x 6
```

```
##   name      max_category max_wind_speed max_pressure max_ts_diameter
##   <chr>      <ord>          <int>          <int>          <dbl>
## 1 Alex       3              105            962            437.
## 2 Beta       3              100            962            115.
## 3 Bill       4              115            962            460.
## 4 Charley    4              125            966            207.
## 5 Danielle   4              115            953            357.
## 6 Danny      3              110            966             92.1
## 7 Dean       5              150            961            351.
## 8 Edouard    3              105            956            322.
## 9 Emily      5              140            971            270.
## 10 Felix     5              150            962            201.
## # ... with 22 more rows, and 1 more variable: max_hu_diameter <dbl>
```

Calculate the distance from each storm observation to Miami in a new variable `distance_to_miami`. This is very challenging. You will need a function that computes distances from two sets of latitude / longitude coordinates.

```
MIAMI_LAT_LONG_COORDS = c(25.7617, -80.1918)
```

```
distance <- function(lat1, long1, lat2, long2){
```

```
  lat1 = lat1 * 180/pi
```

```
  lat2 = lat2 * 180/pi
```

```
  long1 = long1 * 180/pi
```

```
  long2 = long2 * 180/pi
```

```
  # Haversine formula
```

```
  a = sin(lat2 - lat1 / 2)^2 + (cos(lat2) * cos(lat1)) * sin(long2 - long1 / 2)^2
```

```
  b = 2 * atan2(sqrt(a), sqrt(1 - a))
```

```
  distance = 6373.0 * b # Multiplying by radius of earth in KM
```

```
  return(distance)
```

```
}
```

```
storms %>%
```

```
  mutate(distance_to_miami = distance(lat, long, MIAMI_LAT_LONG_COORDS[1], MIAMI_LAT_LONG_COORDS[2]))
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## # A tibble: 779 x 14
```

```
##   name      year month  day hour  lat  long status  category  wind pressure
##   <chr>      <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>    <ord>    <int>    <int>
## 1 Caroline  1975     8    31    0  24  -97  hurrica~ 3         100     973
## 2 Caroline  1975     8    31    6  24.1 -97.5 hurrica~ 3         100     963
## 3 Belle     1976     8     8   18  29.5 -75.3 hurrica~ 3         100     958
## 4 Belle     1976     8     9    0  30.9 -75.3 hurrica~ 3         105     957
## 5 Belle     1976     8     9    6  32.5 -75.2 hurrica~ 3         105     959
## 6 Anita     1977     9     1   18  25.2 -95.5 hurrica~ 3         110     945
## 7 Anita     1977     9     2    0  24.6 -96.2 hurrica~ 5         140     931
## 8 Anita     1977     9     2    6  24.2 -97.1 hurrica~ 5         150     926
```

```
## 9 Anita      1977      9      2      12 23.7 -98 hurrica~ 4      120      940
## 10 David     1979      8     28      0 12.2 -52.9 hurrica~ 4      115      947
## # ... with 769 more rows, and 3 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, distance_to_miami <dbl>
```

For each storm observation, use the function from the previous question to calculate the distance it moved since the previous observation.

#TO-DO

```
storms %<>%
  group_by(name)%>%
  mutate(dist_from_prev = ifelse(name != lag(name), 0, distance(lat, long, lag(lat), lag(long)))) %>%
  mutate(dist_from_prev = ifelse(is.na(dist_from_prev), 0, dist_from_prev))
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

```
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced
```

[illegible]


```
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(a): NaNs produced
## Warning in sqrt(1 - a): NaNs produced
```

```
## Warning in sqrt(a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced

## Warning in sqrt(a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced

## Warning in sqrt(a): NaNs produced

## Warning in sqrt(a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced

## Warning in sqrt(a): NaNs produced

## Warning in sqrt(1 - a): NaNs produced
```

```
storms
```

```
## # A tibble: 779 x 14
## # Groups:   name [72]
##   name      year month   day hour   lat   long status  category  wind pressure
##   <chr>    <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>    <ord>    <int>    <int>
## 1 Caroline 1975     8    31     0  24   -97  hurrica~ 3         100     973
## 2 Caroline 1975     8    31     6  24.1 -97.5 hurrica~ 3         100     963
## 3 Belle    1976     8     8    18  29.5 -75.3 hurrica~ 3         100     958
## 4 Belle    1976     8     9     0  30.9 -75.3 hurrica~ 3         105     957
## 5 Belle    1976     8     9     6  32.5 -75.2 hurrica~ 3         105     959
## 6 Anita    1977     9     1    18  25.2 -95.5 hurrica~ 3         110     945
## 7 Anita    1977     9     2     0  24.6 -96.2 hurrica~ 5         140     931
## 8 Anita    1977     9     2     6  24.2 -97.1 hurrica~ 5         150     926
## 9 Anita    1977     9     2    12  23.7 -98   hurrica~ 4         120     940
## 10 David   1979     8    28     0  12.2 -52.9 hurrica~ 4         115     947
## # ... with 769 more rows, and 3 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, dist_from_prev <dbl>
```

For each storm, find the total distance it moved over its observations and its total displacement. “Distance” is a scalar quantity that refers to “how much ground an object has covered” during its motion. “Displacement” is a vector quantity that refers to “how far out of place an object is”; it is the object’s overall change in position.

```
#TO-DO
storms %>%
  group_by(name) %>%
  summarize(Distance = sum(dist_from_prev),
           Displacement = paste(round(last(lat) - first(lat), 2), round(last(long) - first(long), 2), ,
```

```
## # A tibble: 72 x 3
##   name      Distance Displacement
##   <chr>      <dbl> <chr>
## 1 Alberto    16988. 2.3 / 4.7
## 2 Alex       25008. 2.3 / 6.4
## 3 Alicia         0 0.2 / -0.1
## 4 Andrew    139302. 4 / -20.4
## 5 Anita      17804. -1.5 / -2.5
## 6 Belle      17135. 3 / 0.1
## 7 Beta         0 0 / 0
## 8 Bill       50490. 10.9 / -14.3
## 9 Bob         0 0 / 0
## 10 Bonnie    84162. 9.3 / -6.3
## # ... with 62 more rows
```

For each storm observation, calculate the average speed the storm moved in location.

```
#T0-DO
storms %<>%
  mutate(speed = dist_from_prev / 6)
```

For each storm, calculate its average ground speed (how fast its eye is moving which is different from windspeed around the eye).

```
#T0-DO
storms%>%
  group_by(name)%>%
  mutate(avg_speed = mean(speed))
```

```
## # A tibble: 779 x 16
## # Groups:   name [72]
##   name      year month   day hour   lat  long status  category  wind pressure
##   <chr>      <dbl> <dbl> <int> <dbl> <dbl> <dbl> <chr>    <ord>    <int>    <int>
## 1 Caroline  1975     8    31     0  24   -97  hurrica~ 3        100     973
## 2 Caroline  1975     8    31     6  24.1 -97.5 hurrica~ 3        100     963
## 3 Belle     1976     8     8    18  29.5 -75.3 hurrica~ 3        100     958
## 4 Belle     1976     8     9     0  30.9 -75.3 hurrica~ 3        105     957
## 5 Belle     1976     8     9     6  32.5 -75.2 hurrica~ 3        105     959
## 6 Anita     1977     9     1    18  25.2 -95.5 hurrica~ 3        110     945
## 7 Anita     1977     9     2     0  24.6 -96.2 hurrica~ 5        140     931
## 8 Anita     1977     9     2     6  24.2 -97.1 hurrica~ 5        150     926
## 9 Anita     1977     9     2    12  23.7 -98   hurrica~ 4        120     940
## 10 David    1979     8    28     0  12.2 -52.9 hurrica~ 4        115     947
## # ... with 769 more rows, and 5 more variables: ts_diameter <dbl>,
## #   hu_diameter <dbl>, dist_from_prev <dbl>, speed <dbl>, avg_speed <dbl>
```

Is there a relationship between average ground speed and maximum category attained? Use a dataframe summary (not a regression).

```
#T0-DO
#cor(as.numeric(storms["speed"]), as.numeric(max(storms["category"])))
```

Now we want to transition to building real design matrices for prediction. This is more in tune with what happens in the real world. Large data dump and you convert it into X and y how you see fit.

Suppose we wish to predict the following: given the first three readings of a storm, can you predict its maximum wind speed? Identify the y and identify which features you need x_1, \dots, x_p and build that matrix with `dplyr` functions. This is not easy, but it is what it's all about. Feel free to "featurize" as creatively as you would like. You aren't going to overfit if you only build a few features relative to the total 198 storms.

#TO-DO

```
storms_model = storms %>%
  group_by(name) %>%
  summarise(y = max(wind), avrage_pressure = mean(pressure), avrage_distance = mean(dist_from_prev)) %>%
  select(-name)
storms_model
```

```
## # A tibble: 72 x 3
##       y avrage_pressure avrage_distance
##   <int>          <dbl>          <dbl>
## 1  110           956.           4247.
## 2  105           959.           8336.
## 3  100           962.              0
## 4  150           940.           7332.
## 5  150           936.           4451.
## 6  105           958.           5712.
## 7  100           962              0
## 8  115           951.           4207.
## 9  100           950              0
## 10 100           961.           6012.
## # ... with 62 more rows
```

Fit your model. *#TO-DO* Validate it.

#TO-DO

```
mod = lm(y ~ 0 + ., data = storms_model)
summary(mod)
```

```
##
## Call:
## lm(formula = y ~ 0 + ., data = storms_model)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -32.548 -12.920  -0.889  10.241  39.401
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## avrage_pressure 0.1196206  0.0048119  24.860  <2e-16 ***
## avrage_distance 0.0016080  0.0007217   2.228  0.0291 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 17.82 on 70 degrees of freedom
## Multiple R-squared:  0.9799, Adjusted R-squared:  0.9793
## F-statistic: 1705 on 2 and 70 DF, p-value: < 2.2e-16
```

```

n= nrow(storms)
K = 5
test_indices = sample(1 : n, 1 / K * n)
train_indices = setdiff(1 : n, test_indices)
X = select(storms_model, -y)
y = storms_model$y
X_train = X[train_indices, ]
y_train = y[train_indices]
X_test = X[test_indices, ]
y_test = y[test_indices]
modv = lm(y_train ~., data.frame(X_train))
yhat_oos = predict(mod, data.frame(X_test))
oos_residuals = y_test - yhat_oos
sd(modv$residuals) - sd(oos_residuals)

```

```
## [1] NA
```

```
head(cbind(y_test, yhat_oos))
```

```

##   y_test yhat_oos
## 1     NA      NA
## 2     NA      NA
## 3     NA      NA
## 4     NA      NA
## 5     NA      NA
## 6     NA      NA

```

Assess your level of success at this endeavor.

#TO-DO

The Forward Stepwise Procedure for Probability Estimation Models

Set a seed and load the `adult` dataset and remove missingness and randomize the order.

```

set.seed(1)
pacman::p_load_gh("coatless/ucidata")
data(adult)
adult = na.omit(adult)
adult = adult[sample(1 : nrow(adult)), ]

```

Copy from the previous lab all cleanups you did to this dataset.

```

#TO-DO
adult$fnlwgt = NULL

adult$marital_status = as.character(adult$marital_status)
adult$marital_status = ifelse(adult$marital_status == "Married-AF-spouse" | adult$marital_status == "Married", "Married", "Other")
adult$marital_status = as.factor(adult$marital_status)

```

```

adult$education = as.character(adult$education)
adult$education = ifelse(adult$education == "1st-4th" | adult$education == "Preschool", "<=4th", adult$education)
adult$education = as.factor(adult$education)
adult$education = NULL

tab = sort(table(adult$native_country))
adult$native_country = as.character(adult$native_country)
adult$native_country = ifelse(adult$native_country %in% names(tab[tab<50]), "Other", adult$native_country)
adult$native_country = as.factor(adult$native_country)

adult$worktype = paste(adult$occupation, adult$workclass, sep = ":")
tab_worktype = sort(table(adult$worktype))
adult$occupation = NULL
adult$workclass = NULL

adult$worktype = as.character(adult$worktype)
adult$worktype = ifelse(adult$worktype %in% names(tab_worktype[tab_worktype<100]), "Other", adult$worktype)
adult$worktype = as.factor(adult$worktype)

adult$status = paste(as.character(adult$relationship), as.character(adult$marital_status), sep = ":")
adult$status = as.character(adult$status)
tab_status = sort(table(adult$status))
adult$relationship = NULL
adult$marital_status = NULL
adult$status = as.factor(adult$status)

```

We will be doing model selection. We will split the dataset into 3 distinct subsets. Set the size of our splits here. For simplicity, all three splits will be identically sized. We are making it small so the stepwise algorithm can compute quickly. If you have a faster machine, feel free to increase this.

```
Nsplitsize = 1000
```

Now create the following variables: Xtrain, ytrain, Xselect, yselect, Xtest, ytest with Nsplitsize observations. Binarize the y values.

```

Xtrain = adult[1 : Nsplitsize, ]
Xtrain$income = NULL
ytrain = ifelse(adult[1 : Nsplitsize, "income"] == ">50K", 1, 0)
Xselect = adult[(Nsplitsize + 1) : (2 * Nsplitsize), ]
Xselect$income = NULL
yselect = ifelse(adult[(Nsplitsize + 1) : (2 * Nsplitsize), "income"] == ">50K", 1, 0)
Xtest = adult[(2 * Nsplitsize + 1) : (3 * Nsplitsize), ]
Xtest$income = NULL
ytest = ifelse(adult[(2 * Nsplitsize + 1) : (3 * Nsplitsize), "income"] == ">50K", 1, 0)

```

Fit a vanilla logistic regression on the training set.

```
logistic_mod = glm(ytrain ~ ., Xtrain, family = "binomial")
```

```
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

and report the log scoring rule, the Brier scoring rule.

```

#TO-DO
p_hat_train = predict(logistic_mod, Xtrain, type = 'response')

## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :
## prediction from a rank-deficient fit may be misleading

#in sample log scoring rule
mean(ytrain * log(p_hat_train) + (1 - ytrain) * log(1 - p_hat_train))

## [1] -0.2671121

#in sample Brier scoring rule
mean(-(ytrain - p_hat_train)^2)

## [1] -0.08715781

```

We will be doing model selection using a basis of linear features consisting of all first-order interactions of the 14 raw features (this will include square terms as squares are interactions with oneself).

Create a model matrix from the training data containing all these features. Make sure it has an intercept column too (the one vector is usually an important feature). Cast it as a data frame so we can use it more easily for modeling later on. We're going to need those model matrices (as data frames) for both the select and test sets. So make them here too (copy-paste). Make sure their dimensions are sensible.

```

#TO-DO

Xmm_train = data.frame(model.matrix( ~ . * . , Xtrain))
Xmm_select = data.frame(model.matrix( ~ . * . , Xselect))
Xmm_test = data.frame(model.matrix( ~ . * . , Xtest))

dim(Xmm_train)

## [1] 1000 3104

dim(Xmm_select)

## [1] 1000 3104

dim(Xmm_test)

## [1] 1000 3104

```

Write code that will fit a model stepwise. You can refer to the chunk in the practice lecture. Use the negative Brier score to do the selection. The negative of the Brier score is always positive and lower means better making this metric kind of like `se` so the picture will be the same as the canonical U-shape for oos performance.

Run the code and hit “stop” when you begin to see the Brier score degrade appreciably oos. Be patient as it will wobble.

```

pacman::p_load(Matrix)
p_plus_one = ncol(Xmm_train)
predictor_by_iteration = c() #keep a growing list of predictors by iteration
in_sample_brier_by_iteration = c() #keep a growing list of briers by iteration
oos_brier_by_iteration = c() #keep a growing list of briers by iteration
i = 1

repeat {

  #get all predictors left to try
  all_brier = array(NA, p_plus_one) #record all possibilities
  for (j_try in 1 : p_plus_one){
    if (j_try %in% predictor_by_iteration){
      next
    }
    Xmm_sub = Xmm_train[, c(predictor_by_iteration, j_try), drop = FALSE]
    logistic_mod = suppressWarnings(glm(ytrain ~ ., Xmm_sub, family = "binomial"))
    phat_train = suppressWarnings(predict(logistic_mod, Xmm_sub, type = 'response'))
    all_brier[j_try] = mean(-(ytrain - phat_train)^2)
  }
  j_star = which.max(all_brier)
  predictor_by_iteration = c(predictor_by_iteration, j_star)
  in_sample_brier_by_iteration = c(in_sample_brier_by_iteration, all_brier[j_star])

  #now let's look at oos
  Xmm_sub = Xmm_train[, predictor_by_iteration, drop = FALSE]

  logistic_mod = suppressWarnings(glm(ytrain ~ ., Xmm_sub, family = "binomial"))
  phat_train = suppressWarnings(predict(logistic_mod, Xmm_sub, type = 'response'))
  all_brier[j_try] = mean(-(ytrain - phat_train)^2)

  phat_select = suppressWarnings(predict(logistic_mod, Xmm_select[, predictor_by_iteration, drop = FALSE], type = 'response'))
  oos_brier = mean(-(yselect - phat_select)^2)
  oos_brier_by_iteration = c(oos_brier_by_iteration, oos_brier)

  cat("i =", i, "in-sample_brier =", all_brier[j_star], "oos_brier =", oos_brier, "\n    predictor added\n")

  i = i + 1

  if (i > 10){
    break
  }
}

```

```

## i = 1 in-sample_brier = -0.1481517 oos_brier = -0.1543828
##   predictor added: age.education_num
## i = 2 in-sample_brier = -0.1346776 oos_brier = -0.1472043
##   predictor added: age.capital_gain
## i = 3 in-sample_brier = -0.1244369 oos_brier = -0.1362633
##   predictor added: education_num.sexMale
## i = 4 in-sample_brier = -0.1165644 oos_brier = -0.1291617
##   predictor added: age.statusWife.Married

```



```
## i = 5 in-sample_brier = -0.1116817 oos_brier = -0.1279595
##   predictor added: hours_per_week.statusNot.in.family.Never.married
## i = 6 in-sample_brier = -0.1087885 oos_brier = -0.1269657
##   predictor added: age.statusNot.in.family.Divorced
## i = 7 in-sample_brier = -0.1058228 oos_brier = -0.1282639
##   predictor added: statusNot.in.family.Married.spouse.absent
## i = 8 in-sample_brier = -0.1031665 oos_brier = -0.1278538
##   predictor added: raceWhite.capital_loss
## i = 9 in-sample_brier = -0.1008492 oos_brier = -0.1270625
##   predictor added: sexMale.worktypeOther.service.Private
## i = 10 in-sample_brier = -0.09941457 oos_brier = -0.1256182
##   predictor added: education_num.worktypeFarming.fishing.Self.emp.not.inc
```

Plot the in-sample and oos (select set) Brier score by p . Does this look like what's expected?

#TO-DO

```
simulation_results = data.frame(
  iteration = 1 : length(in_sample_brier_by_iteration),
  in_sample_brier_by_iteration = in_sample_brier_by_iteration,
  oos_brier_by_iteration = oos_brier_by_iteration
)

pacman::p_load(latex2exp)
ggplot(simulation_results) +
  geom_line(aes(x = iteration, y = in_sample_brier_by_iteration), color = "red") +
  geom_line(aes(x = iteration, y = oos_brier_by_iteration), color = "blue") +
  #ylim(0, max(c(simulation_results$in_sample_brier_by_iteration, simulation_results$oos_brier_by_itera
  ylab(TeX("$brier score$"))
```

