HW1

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```r
# Read in data
crsp <- read.csv("./hw1_crsp.csv",header = TRUE)
crsp$Alcoa <- as.numeric(as.character(crsp$Alcoa))
```

```
## Warning: NAs introduced by coercion
```

```r
crsp$Kodak <- NULL
crsp$GM <- NULL
crsp[is.na(crsp)] <- 0

# Descriptives
summary(crsp)
```

```
##      Date               Alcoa               Honeywell
##  Min.   :20000103   Min.   :-0.160539   Min.   :-0.1778350
##  1st Qu.:20040406   1st Qu.:-0.013333   1st Qu.:-0.0088850
##  Median :20080707   Median : 0.000000   Median : 0.0003460
##  Mean   :20080724   Mean   : 0.000138   Mean   : 0.0004641
##  3rd Qu.:20121001   3rd Qu.: 0.013080   3rd Qu.: 0.0094990
##  Max.   :20161230   Max.   : 0.232117   Max.   : 0.2822300
##      AMEX                AT.T                Boeing
##  Min.   :-0.1759490   Min.   :-0.1907580   Min.   :-0.176254
##  1st Qu.:-0.0089690   1st Qu.:-0.0076810   1st Qu.:-0.009363
##  Median : 0.0001830   Median : 0.0002340   Median : 0.000676
##  Mean   : 0.0004217   Mean   : 0.0001695   Mean   : 0.000578
##  3rd Qu.: 0.0098220   3rd Qu.: 0.0078560   3rd Qu.: 0.010821
##  Max.   : 0.2064850   Max.   : 0.2317160   Max.   : 0.154627
##   Caterpillar           Citigroup            Coca.Cola
##  Min.   :-0.1451750   Min.   :-0.3902440   Min.   :-0.1006100
##  1st Qu.:-0.0098220   1st Qu.:-0.0102250   1st Qu.:-0.0058610
##  Median : 0.0003980   Median : 0.0000000   Median : 0.0002510
##  Mean   : 0.0006365   Mean   : 0.0001481   Mean   : 0.0002749
##  3rd Qu.: 0.0109900   3rd Qu.: 0.0102270   3rd Qu.: 0.0064320
##  Max.   : 0.1472290   Max.   : 0.5782490   Max.   : 0.1387950
##     DuPont               Exxon                  GE
##  Min.   :-0.1133280   Min.   :-0.1395250   Min.   :-0.1278910
##  1st Qu.:-0.0086120   1st Qu.:-0.0073480   1st Qu.:-0.0080050
##  Median : 0.0001670   Median : 0.0004520   Median : 0.0000000
##  Mean   : 0.0003343   Mean   : 0.0004089   Mean   : 0.0001935
##  3rd Qu.: 0.0090230   3rd Qu.: 0.0084030   3rd Qu.: 0.0083440
##  Max.   : 0.1184680   Max.   : 0.1719050   Max.   : 0.1970310
##      HP                Home.Depot            Intel
##  Min.   :-0.2002710   Min.   :-0.2873560   Min.   :-0.2203300
##  1st Qu.:-0.0109270   1st Qu.:-0.0088520   1st Qu.:-0.0108160
##  Median : 0.0002450   Median : 0.0002670   Median : 0.0004050
##  Mean   : 0.0002661   Mean   : 0.0004362   Mean   : 0.0003467
```

```
##   3rd Qu.: 0.0115430   3rd Qu.: 0.0095830   3rd Qu.: 0.0114870
##   Max.   : 0.1728830   Max.   : 0.1406660   Max.   : 0.2012290
##        IBM                  IP                  J.J
##   Min.   :-0.1554200   Min.   :-0.1852020   Min.   :-0.1584560
##   1st Qu.:-0.0073000   1st Qu.:-0.0105780   1st Qu.:-0.0052420
##   Median : 0.0002160   Median : 0.0002660   Median : 0.0001770
##   Mean   : 0.0003036   Mean   : 0.0003809   Mean   : 0.0003862
##   3rd Qu.: 0.0079660   3rd Qu.: 0.0113670   3rd Qu.: 0.0060580
##   Max.   : 0.1304350   Max.   : 0.2188370   Max.   : 0.1222920
##      JPMorgan            McDonald.s             Merck
##   Min.   :-0.2072740   Min.   :-0.1281700   Min.   :-0.2678060
##   1st Qu.:-0.0096680   1st Qu.:-0.0068380   1st Qu.:-0.0078530
##   Median : 0.0002440   Median : 0.0007200   Median : 0.0002780
##   Mean   : 0.0006593   Mean   : 0.0004681   Mean   : 0.0002822
##   3rd Qu.: 0.0101600   3rd Qu.: 0.0075060   3rd Qu.: 0.0087520
##   Max.   : 0.2509670   Max.   : 0.0938950   Max.   : 0.1303290
##     Microsoft               X3M                 Altria
##   Min.   :-0.1559780   Min.   :-0.0895690   Min.   :-0.1384360
##   1st Qu.:-0.0085900   1st Qu.:-0.0063940   1st Qu.:-0.0060000
##   Median : 0.0000000   Median : 0.0004650   Median : 0.0010210
##   Mean   : 0.0002996   Mean   : 0.0005066   Mean   : 0.0009239
##   3rd Qu.: 0.0090020   3rd Qu.: 0.0075030   3rd Qu.: 0.0079820
##   Max.   : 0.1956520   Max.   : 0.1107140   Max.   : 0.1637530
##        P.G                 SBC                United.Tech
##   Min.   :-0.3137960   Min.   :-0.1266120   Min.   :-0.2824770
##   1st Qu.:-0.0054420   1st Qu.:-0.0072990   1st Qu.:-0.0074470
##   Median : 0.0002420   Median : 0.0004190   Median : 0.0004250
##   Mean   : 0.0003006   Mean   : 0.0002968   Mean   : 0.0005134
##   3rd Qu.: 0.0061070   3rd Qu.: 0.0077420   3rd Qu.: 0.0088310
##   Max.   : 0.1021440   Max.   : 0.1628010   Max.   : 0.1364690
##      Walmart               Disney
##   Min.   :-0.1004050   Min.   :-0.1836300
##   1st Qu.:-0.0070520   1st Qu.:-0.0087970
##   Median : 0.0001850   Median : 0.0004380
##   Mean   : 0.0001855   Mean   : 0.0005368
##   3rd Qu.: 0.0070440   3rd Qu.: 0.0094750
##   Max.   : 0.1107310   Max.   : 0.1597220
```

```r
# 2a)
# Split
train_1 <- crsp[crsp$Date < 20060101,]
train_2 <- crsp[crsp$Date > 20051231 & crsp$Date < 20110101,]
test <- crsp[crsp$Date > 20101231,]

# PCA
row.names(crsp) <- crsp$Date
crsp <- crsp[,2:29]
train_1 <- train_1[,2:29]
train_2 <- train_2[,2:29]
test <- test[,2:29]
pr.out = prcomp(train_1, scale =TRUE)
pr.out$rotation
```

```
##                      PC1           PC2           PC3           PC4           PC5
```

2

```
## Alcoa       0.2142975 -0.03799880  0.278903882 -0.125922759  0.182555482
## Honeywell   0.2109223  0.02243377  0.167541907 -0.231305424 -0.092784942
## AMEX        0.2406673  0.07974884 -0.046460984  0.182401004  0.058871454
## AT.T        0.1314005  0.19307147 -0.168839859  0.020707250  0.528535517
## Boeing      0.1816753 -0.05239928  0.104032060 -0.157830668 -0.231879738
## Caterpillar 0.2213822 -0.07406633  0.230668245 -0.073222722  0.013001530
## Citigroup   0.2541780  0.11804415 -0.040611837  0.151318817  0.113385953
## Coca.Cola   0.1246240 -0.28316546 -0.240910376  0.111114416 -0.166990312
## DuPont      0.2231029 -0.16372199  0.257058506 -0.082267246  0.082072440
## Exxon       0.1639219 -0.16544967 -0.124962593 -0.251748936  0.226923144
## GE          0.2521755  0.05997312  0.005929516  0.059966418 -0.071229551
## HP          0.1678450  0.31276219 -0.088776532 -0.176399535 -0.206192636
## Home.Depot  0.2049337  0.00713909  0.070702250  0.463835036 -0.019497392
## Intel       0.1801840  0.33251264 -0.179456202 -0.104113528 -0.206215029
## IBM         0.1843321  0.26689133 -0.180936050 -0.108300080 -0.117225287
## IP          0.2115401 -0.09921964  0.339503371 -0.033078550  0.158393836
## J.J         0.1309506 -0.28577355 -0.351128164 -0.137286538 -0.157441869
## JPMorgan    0.2400139  0.12756874 -0.003288830  0.126584751  0.123386968
## McDonald.s  0.1305580 -0.14657372 -0.029208741  0.210428927 -0.115892685
## Merck       0.1255797 -0.22889313 -0.325667233 -0.177104484 -0.027543942
## Microsoft   0.1815827  0.30409424 -0.174708740 -0.091506825 -0.161686204
## X3M         0.2162171 -0.17912852  0.128733944 -0.058738247 -0.024318417
## Altria      0.0830785 -0.24196086 -0.163004042 -0.249095884  0.185316786
## P.G         0.1129630 -0.34433052 -0.138934911  0.129912581 -0.210987363
## SBC         0.1535486 -0.04029904 -0.304055758  0.008767987  0.433475862
## United.Tech 0.2214099 -0.05937921  0.215134162 -0.157270729 -0.199372785
## Walmart     0.1905009 -0.07294557 -0.054525796  0.511549477 -0.074349530
## Disney      0.1865512  0.14430896 -0.007464072  0.001195040 -0.006531555
##                      PC6          PC7          PC8          PC9
## Alcoa       -0.061054199  0.034303820  0.225213789 -0.133087328
## Honeywell    0.047200209  0.085683752 -0.188578212  0.080289005
## AMEX         0.165481278 -0.019655169  0.037625048  0.341381208
## AT.T        -0.045098569  0.047931859 -0.188961814 -0.115918871
## Boeing       0.022454918  0.399167749 -0.462902863  0.163125160
## Caterpillar  0.017997779 -0.188909816  0.085312993 -0.114349654
## Citigroup    0.178194922 -0.112232000  0.029828016  0.284525450
## Coca.Cola   -0.153089686 -0.165729662 -0.273025076 -0.138528756
## DuPont      -0.052197991 -0.188291990  0.112701366 -0.107299893
## Exxon        0.113738582  0.181112898 -0.145813300 -0.375546873
## GE           0.102360331 -0.013151604  0.027712878  0.180499064
## HP          -0.195145780  0.002524797  0.113514734 -0.067828402
## Home.Depot   0.001250351  0.176297770 -0.068422491 -0.215577139
## Intel       -0.152062702 -0.181078379  0.008689088 -0.149645175
## IBM         -0.111605481 -0.120445297  0.141874997 -0.076514885
## IP           0.017441342 -0.127337391  0.175036739 -0.165065400
## J.J          0.351384359  0.032037730  0.175160363 -0.040544928
## JPMorgan     0.157863510 -0.148433333  0.084430487  0.303376136
## McDonald.s  -0.434231730  0.430470565  0.438235715 -0.008420119
## Merck        0.362943053  0.186839828  0.330715098 -0.040708542
## Microsoft   -0.033012323 -0.097233329 -0.053166314 -0.271196614
## X3M         -0.009382604 -0.148151218 -0.071826879 -0.082947468
## Altria      -0.543107698  0.016450769  0.008739580  0.306002194
## P.G         -0.163098918 -0.438026487 -0.055486410  0.162972366
## SBC         -0.121165650 -0.003887524 -0.194210197  0.049379653
```

```
## United.Tech  0.024925129  0.108407063 -0.241558036  0.107895748
## Walmart     -0.007785874  0.098823129 -0.138549081 -0.257216150
## Disney      -0.041455546  0.319905132  0.104055309  0.195091337
##                      PC10        PC11        PC12        PC13
## Alcoa        -0.06492826  0.080343938  0.039365517  0.110500206
## Honeywell     0.10768509 -0.001495456  0.062871434  0.142533349
## AMEX         -0.18779039  0.055824780 -0.049210508 -0.059464828
## AT.T          0.44249647  0.118381535  0.122318524 -0.508626143
## Boeing        0.16964847 -0.004820625 -0.186852604 -0.031579723
## Caterpillar  -0.08913405 -0.082832328 -0.099022230  0.051391497
## Citigroup    -0.13950157 -0.023874579 -0.138580250 -0.147007034
## Coca.Cola    -0.38920939  0.324413413  0.201774848 -0.041547620
## DuPont        0.08773543  0.071417148  0.034717327  0.052720474
## Exxon        -0.43037625  0.054345135 -0.141539522 -0.220700360
## GE           -0.07195045  0.012312604  0.038066128 -0.033273278
## HP            0.14510247  0.017284403  0.048242419  0.125945100
## Home.Depot    0.03977095 -0.310636751  0.132440133 -0.005212805
## Intel         0.07726381 -0.073913194 -0.073028375 -0.108645671
## IBM          -0.10569501  0.005564174 -0.075729490  0.045555889
## IP            0.12779928  0.017728909  0.116649656  0.081011983
## J.J           0.09321498  0.048568981  0.146942573 -0.029877908
## JPMorgan     -0.15563789 -0.028875972 -0.210449446 -0.054489882
## McDonald.s    0.03906432  0.333046886 -0.355682736 -0.178208582
## Merck         0.23962604 -0.246660855 -0.054009300  0.074809279
## Microsoft    -0.05873257 -0.074708821 -0.020700419  0.040074716
## X3M           0.03341076 -0.058065708  0.057672250 -0.181020813
## Altria       -0.15101879 -0.593830565  0.104931143 -0.063408445
## P.G           0.37224395  0.156697908  0.055339986 -0.102022884
## SBC           0.12163126  0.233317482 -0.189025671  0.673298509
## United.Tech   0.08450012  0.056303096 -0.147704054 -0.026890811
## Walmart       0.05326743 -0.309008348 -0.004076567  0.194336202
## Disney       -0.09312738  0.196763625  0.731126995  0.086568132
##                      PC14        PC15        PC16        PC17
## Alcoa         0.151738837 -0.099363215 -0.057643975 -0.326181153
## Honeywell     0.258265737 -0.002463448 -0.512074018  0.413520715
## AMEX         -0.016592547 -0.021915266  0.127935649 -0.056896042
## AT.T          0.085428162  0.089092487 -0.038022157  0.150169452
## Boeing        0.064479589 -0.016181488  0.224338754 -0.183352234
## Caterpillar   0.008579116  0.108062439 -0.021732713  0.390129690
## Citigroup     0.063161648  0.051888337  0.056187972 -0.059946644
## Coca.Cola     0.451424314  0.277494070  0.128413045  0.108361992
## DuPont       -0.089362676  0.140275617  0.086584878 -0.187837057
## Exxon        -0.214214061 -0.044599380 -0.244990740 -0.308588534
## GE           -0.020932290 -0.103761746 -0.117340777  0.010156019
## HP           -0.036087602  0.516939706  0.199439630 -0.182803137
## Home.Depot    0.022641120  0.057116481 -0.052857116 -0.044928304
## Intel         0.063930232 -0.161055918  0.174124240 -0.105783455
## IBM          -0.332679651  0.177472033 -0.387606862  0.100034798
## IP            0.194818609 -0.208359651  0.206235618  0.006940003
## J.J          -0.275626203 -0.241562457  0.234335497  0.251321725
## JPMorgan      0.107517421  0.039719639 -0.002296412 -0.011499721
## McDonald.s    0.033266884 -0.095525904 -0.007233323  0.193433330
## Merck         0.358244858  0.262771983 -0.085038239 -0.126382561
## Microsoft     0.225517658 -0.525337396  0.093303810  0.049254109
```

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## X3M         -0.359233827  0.171086507  0.292897225  0.252719051
## Altria       0.027879748 -0.086608508  0.052763001  0.034322847
## P.G         -0.062500247 -0.161928361 -0.345617593 -0.338719503
## SBC         -0.119167561 -0.052214160  0.104803122  0.057199128
## United.Tech -0.162760434 -0.023826744 -0.013017206 -0.027999245
## Walmart     -0.143527609  0.018027788 -0.082597118 -0.012989716
## Disney      -0.137819235 -0.074848816 -0.048391329 -0.072523010
##                       PC18         PC19         PC20         PC21
## Alcoa        0.2833204141  0.104449312  0.080647184  0.0111847551
## Honeywell   -0.2414517131  0.253367544  0.142644445 -0.3352075683
## AMEX        -0.1400243928  0.151147815  0.128726673 -0.0746637661
## AT.T         0.1029959664  0.050162815 -0.017675601  0.1627713492
## Boeing       0.3915522774 -0.012433331 -0.144861865 -0.2189200399
## Caterpillar  0.0643542901 -0.166485811 -0.700536337  0.1537974132
## Citigroup   -0.0080373261  0.004957395 -0.045646491 -0.0334830783
## Coca.Cola    0.1584835943 -0.007978592  0.100285612  0.0842577619
## DuPont       0.0534576176  0.013775297  0.129970024 -0.0703217009
## Exxon       -0.2724662539  0.082266701 -0.138907085 -0.1004286039
## GE          -0.0004915302  0.128466560  0.235289912  0.3246917113
## HP          -0.2960499904  0.428645806 -0.138127899  0.1333321897
## Home.Depot   0.0768477845  0.065993944 -0.051824894 -0.0771892978
## Intel       -0.0330176308 -0.174825032 -0.072488869 -0.3870794269
## IBM          0.5610903954 -0.096467963  0.216919687  0.0007586122
## IP           0.0558286303  0.126875082  0.115854616 -0.0208002215
## J.J          0.1932328943  0.427215952 -0.106576260 -0.0115889353
## JPMorgan     0.0078546904 -0.042438622 -0.141985199 -0.1151536227
## McDonald.s  -0.1023654650 -0.021928117  0.011769137 -0.0446181003
## Merck       -0.0588585317 -0.374587020  0.100245825  0.0559964344
## Microsoft   -0.1409901920 -0.120401575  0.072441644  0.2259338270
## X3M         -0.2264913987 -0.329269953  0.343655643 -0.2451227571
## Altria       0.0316399992  0.096414557  0.017800841  0.0735561770
## P.G         -0.0995993034 -0.018203593 -0.191141936 -0.0452963642
## SBC         -0.0523019726 -0.101409295 -0.002138181 -0.0291530576
## United.Tech -0.1208636828 -0.177977276  0.096596647  0.5808505458
## Walmart     -0.0521975809  0.069238046  0.025135031  0.0564096292
## Disney      -0.0734397785 -0.315666418 -0.203645162 -0.0515023233
##                       PC22         PC23         PC24         PC25
## Alcoa       -0.560391107  0.227843080  0.028619465  0.2443993470
## Honeywell   -0.015595495  0.022888426  0.116489298  0.0739114736
## AMEX         0.035318883 -0.096633849  0.144805986 -0.3466108325
## AT.T         0.007300921  0.093948193  0.048379981  0.0003639435
## Boeing       0.138546073  0.095337077 -0.248584015 -0.0471162976
## Caterpillar -0.070120346  0.089991821 -0.054376563 -0.1987988417
## Citigroup    0.036665083  0.014607563  0.073676983  0.1208984211
## Coca.Cola   -0.019577240 -0.010708794  0.068698772  0.0053126793
## DuPont       0.460165995  0.174689620  0.367994952  0.0944217207
## Exxon        0.083576033 -0.074184078 -0.083884973 -0.0983689661
## GE          -0.205059452  0.263827313 -0.329008809 -0.3991140660
## HP          -0.002677682 -0.034695011 -0.187745053  0.0795977721
## Home.Depot  -0.210552187 -0.581607261  0.003171687  0.0975759010
## Intel       -0.257568827  0.045141309  0.406921853 -0.3119897827
## IBM          0.172607191 -0.166307331 -0.075135713 -0.0479845377
## IP           0.298244617 -0.307016583 -0.201201023 -0.3062525444
## J.J         -0.076151313 -0.019349014  0.158022411  0.1583577192
```

5

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## JPMorgan     0.105286172 -0.006341064 -0.094136720  0.4636189195
## McDonald.s   0.050536791  0.007501794 -0.006244521  0.0193572663
## Merck        0.022966044 -0.007618754 -0.018892562 -0.0867833938
## Microsoft    0.211279176  0.021187707 -0.205830515  0.2985639016
## X3M         -0.218257677  0.053185772 -0.310706763  0.1531507209
## Altria       0.038019126 -0.009169325  0.046074132  0.0044608529
## P.G         -0.027318991 -0.075204190 -0.175689850  0.0199516859
## SBC         -0.103563703 -0.107685716 -0.020965476 -0.0392459076
## United.Tech -0.094572311 -0.246072280  0.412986409  0.0849483401
## Walmart      0.152106911  0.508834528  0.111263196 -0.0191003245
## Disney       0.105491974  0.047185669  0.015109013  0.0323908556
##                       PC26          PC27          PC28
## Alcoa        -0.2173169312 -0.1172260300  0.0006187855
## Honeywell    -0.0065201430 -0.0174381548  0.0458701200
## AMEX         -0.3967566096 -0.4779809689 -0.2902158493
## AT.T         -0.0528551966 -0.0287249708 -0.0788322745
## Boeing        0.0003130246 -0.0789356146 -0.0055535187
## Caterpillar  -0.0161986777 -0.1898679128 -0.0255795365
## Citigroup     0.0452889911 -0.0009553788  0.8103302338
## Coca.Cola    -0.0189622073  0.0706149956 -0.0162812109
## DuPont        0.4472278807 -0.2726199813 -0.0916213847
## Exxon         0.0187006464  0.0851595929 -0.0003054452
## GE            0.5211898475  0.1116240488 -0.0810208138
## HP           -0.0619132041  0.0166590259  0.0225713882
## Home.Depot    0.3012818823 -0.1642603747 -0.0466103544
## Intel         0.1105373726  0.2461270456 -0.0455491460
## IBM          -0.1582847439 -0.0066300924  0.0229123091
## IP           -0.2306645057  0.3948505540  0.0955376741
## J.J           0.0313731531  0.0543465161 -0.0010070492
## JPMorgan      0.0552704697  0.4164412941 -0.4652535090
## McDonald.s    0.0382075993  0.0004044733  0.0305686508
## Merck        -0.0350151651 -0.0384674626 -0.0217960585
## Microsoft    -0.0120390173 -0.3258030325  0.0025971243
## X3M          -0.0793967868 -0.0545492576  0.0165928879
## Altria       -0.0078170406  0.0129851673 -0.0014432048
## P.G          -0.0928686479 -0.0603757457  0.0140407074
## SBC           0.1044688285 -0.0038599571  0.0306459706
## United.Tech  -0.1255029862  0.1926405367 -0.0180359078
## Walmart      -0.2896841386  0.1964415014  0.0191600983
## Disney       -0.0179738302  0.0711645456  0.0227630376
```

```r
# 2b) & 2c)
prin_comp_train2 <- as.matrix(train_2) %*% pr.out$rotation

# stack vertically data of all the other firms
pca_pred_all <- matrix(,nrow=1228,ncol=869)
dummy_total <- matrix(,nrow=1228,ncol=28)
pca_list <- list()
for (i in 1:28)
{
  pca_list[[i]] <- as.matrix(train_2[32:1259,i])
  for (j in 1:31)
  {
    temp <- prin_comp_train2[j:(j+1227),]
```

```
    colnames(temp) <- paste(colnames(temp),j,sep=" ")
    pca_list[[i]] <- cbind(pca_list[[i]],temp)
  }
  dummy <- matrix(rep(0,34384),nrow=1228,ncol=28)
  dummy[,i] <- rep(1,1228)
  pca_pred_all <- rbind(pca_pred_all,pca_list[[i]])
  dummy_total <- rbind(dummy_total,dummy)
}
pca_pred_all <- pca_pred_all[1229:35612,]
dummy_total <- dummy_total[1229:35612,]
pca_pred_all <- cbind(pca_pred_all,dummy_total)

dim(pca_pred_all)
```

```
## [1] 34384   897
```

```
head(pca_pred_all,3)
```

```
##                       PC1 1        PC2 1        PC3 1         PC4 1
## 1509 -0.016834 0.0618764622 -0.009005572 -0.031198107 -0.019022964
## 1510  0.000329 0.0060574295 -0.002502556 -0.012610708 -0.025891540
## 1511 -0.005925 0.0004829203  0.014512492 -0.006585131 -0.004607982
##               PC5 1        PC6 1        PC7 1        PC8 1        PC9 1
## 1509  0.001648370  0.021070902 -0.002685604 -0.00174751 -0.009641658
## 1510 -0.006022327 -0.011728503 -0.001833900  0.01065402 -0.018271134
## 1511  0.006129361 -0.001273545 -0.004420920  0.01238994  0.010100227
##              PC10 1       PC11 1       PC12 1        PC13 1       PC14 1
## 1509 -0.010350972  0.001950828  0.009991164 -0.0157035259 0.001622184
## 1510  0.018273315 -0.002078127 -0.015090549  0.0065534449 0.005677661
## 1511 -0.009420998  0.013708361  0.009761594 -0.0002097264 0.007697371
##              PC15 1       PC16 1       PC17 1       PC18 1      PC19 1
## 1509 -0.009474550  0.004257509 -0.018572048 -0.017872774 -0.01028237
## 1510  0.005682009  0.013957138  0.006119040  0.001955331  0.01380972
## 1511 -0.004775937 -0.003225963 -0.001056151  0.003956789 -0.01119514
##              PC20 1       PC21 1       PC22 1       PC23 1       PC24 1
## 1509 -0.0000821958 -0.008858200 -0.010292154 -0.014557315  0.005494579
## 1510 -0.0231925286  0.005958968 -0.004439723  0.012762202 -0.009528325
## 1511 -0.0013434507 -0.004794440 -0.004909229  0.000196615  0.012445290
##              PC25 1       PC26 1       PC27 1        PC28 1        PC1 2
## 1509  0.006662346  0.008965314 -0.012991394 -0.0043897868 0.0060574295
## 1510 -0.011076204 -0.008150845  0.004119893 -0.0087287901 0.0004829203
## 1511 -0.004638913 -0.004086605 -0.002143174 -0.0007015827 0.0400484473
##              PC2 2        PC3 2        PC4 2        PC5 2        PC6 2
## 1509 -0.002502556 -0.012610708 -0.025891540 -0.006022327 -0.011728503
## 1510  0.014512492 -0.006585131 -0.004607982  0.006129361 -0.001273545
## 1511  0.008116693 -0.007537109 -0.009686308  0.009665139 -0.013425010
##              PC7 2       PC8 2       PC9 2       PC10 2       PC11 2
## 1509 -0.001833900 0.010654015 -0.01827113  0.018273315 -0.002078127
## 1510 -0.004420920 0.012389941  0.01010023 -0.009420998  0.013708361
## 1511 -0.004965737 0.007883088 -0.01280669 -0.007488470  0.004455149
##              PC12 2       PC13 2       PC14 2       PC15 2       PC16 2
## 1509 -0.015090549  0.0065534449  0.005677661  0.005682009  0.013957138
```

```
## 1510   0.009761594 -0.0002097264  0.007697371 -0.004775937 -0.003225963
## 1511   0.009796963  0.0046310212 -0.012899256  0.021128283 -0.013716006
##              PC17 2        PC18 2       PC19 2        PC20 2       PC21 2
## 1509   0.006119040  0.001955331  0.01380972 -0.023192529  0.005958968
## 1510  -0.001056151  0.003956789 -0.01119514 -0.001343451 -0.004794440
## 1511   0.015664660 -0.004984139  0.01054172 -0.006544914  0.003493204
##              PC22 2        PC23 2       PC24 2       PC25 2       PC26 2
## 1509  -0.004439723  0.012762202 -0.009528325 -0.011076204 -0.008150845
## 1510  -0.004909229  0.000196615  0.012445290 -0.004638913 -0.004086605
## 1511   0.007402467 -0.012347033 -0.006278726 -0.007387681 -0.004168872
##              PC27 2        PC28 2       PC1 3        PC2 3        PC3 3
## 1509   0.004119893 -0.0087287901 0.0004829203  0.014512492 -0.006585131
## 1510  -0.002143174 -0.0007015827 0.0400484473  0.008116693 -0.007537109
## 1511   0.009450309 -0.0026081203 0.0237117731 -0.006968638 -0.007629069
##              PC4 3        PC5 3        PC6 3        PC7 3        PC8 3
## 1509  -0.004607982 0.0061293607 -0.001273545 -0.004420920 0.012389941
## 1510  -0.009686308 0.0096651387 -0.013425010 -0.004965737 0.007883088
## 1511   0.008071468 0.0001226657 -0.001545786  0.006448434 0.018828864
##              PC9 3        PC10 3        PC11 3        PC12 3        PC13 3
## 1509   0.010100227 -0.0094209979 0.013708361  0.009761594 -0.0002097264
## 1510  -0.012806689 -0.0074884705 0.004455149  0.009796963  0.0046310212
## 1511   0.009518668 -0.0003227616 0.004779382 -0.001673473 -0.0048792470
##              PC14 3        PC15 3        PC16 3        PC17 3        PC18 3
## 1509   0.007697371 -0.004775937 -0.003225963 -0.001056151  0.003956789
## 1510  -0.012899256  0.021128283 -0.013716006  0.015664660 -0.004984139
## 1511   0.005908792  0.007149380  0.010246896 -0.001494674 -0.016051523
##              PC19 3        PC20 3        PC21 3        PC22 3        PC23 3
## 1509  -0.011195140 -0.001343451 -0.004794440 -0.004909229  0.000196615
## 1510   0.010541717 -0.006544914  0.003493204  0.007402467 -0.012347033
## 1511  -0.006675178 -0.018022127  0.007203784 -0.019176731 -0.007305708
##              PC24 3        PC25 3        PC26 3        PC27 3        PC28 3
## 1509   0.012445290 -0.004638913 -0.004086605 -0.002143174 -0.0007015827
## 1510  -0.006278726 -0.007387681 -0.004168872  0.009450309 -0.0026081203
## 1511   0.006855543  0.002783232 -0.009870481 -0.008933310 -0.0201294902
##              PC1 4        PC2 4        PC3 4        PC4 4        PC5 4
## 1509   0.040048447  0.008116693 -0.0075371092 -0.009686308  0.0096651387
## 1510   0.023711773 -0.006968638 -0.0076290687  0.008071468  0.0001226657
## 1511  -0.001416287  0.004241126 -0.0009128507  0.015700062 -0.0088623473
##              PC6 4        PC7 4        PC8 4        PC9 4        PC10 4
## 1509  -0.013425010 -0.004965737  0.007883088 -0.012806689 -0.0074884705
## 1510  -0.001545786  0.006448434  0.018828864  0.009518668 -0.0003227616
## 1511   0.001637617  0.012590210 -0.009178728 -0.003052368 -0.0073215053
##              PC11 4        PC12 4        PC13 4        PC14 4        PC15 4
## 1509   0.004455149  0.009796963  0.004631021 -0.012899256 0.0211282828
## 1510   0.004779382 -0.001673473 -0.004879247  0.005908792 0.0071493796
## 1511  -0.005872727  0.010918354 -0.001593391 -0.007800901 0.0005703029
##              PC16 4        PC17 4        PC18 4        PC19 4        PC20 4
## 1509  -1.371601e-02  0.015664660 -0.004984139  0.010541717 -0.006544914
## 1510   1.024690e-02 -0.001494674 -0.016051523 -0.006675178 -0.018022127
## 1511   6.296553e-05  0.004794133 -0.004775511  0.005446684 -0.007470543
##              PC21 4        PC22 4        PC23 4       PC24 4       PC25 4
## 1509 0.003493204  0.007402467 -0.012347033 -0.006278726 -0.007387681
## 1510 0.007203784 -0.019176731 -0.007305708  0.006855543  0.002783232
## 1511 0.001271042  0.025941426 -0.025523894 -0.008248756  0.001846599
```

```
##              PC26 4       PC27 4       PC28 4       PC1 5        PC2 5
## 1509 -0.004168872  0.009450309 -0.002608120  0.023711773 -0.006968638
## 1510 -0.009870481 -0.008933310 -0.020129490 -0.001416287  0.004241126
## 1511  0.006587217  0.005099990  0.004724048  0.011482678  0.014761153
##              PC3 5        PC4 5        PC5 5        PC6 5        PC7 5
## 1509 -0.0076290687 0.008071468  0.0001226657 -0.001545786 0.006448434
## 1510 -0.0009128507 0.015700062 -0.0088623473  0.001637617 0.012590210
## 1511 -0.0237087656 0.023693820 -0.0051428173 -0.014307589 0.026120380
##              PC8 5        PC9 5        PC10 5       PC11 5       PC12 5
## 1509  0.018828864  0.009518668 -0.0003227616  0.004779382 -0.001673473
## 1510 -0.009178728 -0.003052368 -0.0073215053 -0.005872727  0.010918354
## 1511 -0.009207667 -0.004313322  0.0033009747 -0.011626549 -0.001014387
##              PC13 5       PC14 5       PC15 5       PC16 5       PC17 5
## 1509 -0.004879247  0.005908792 0.0071493796  1.024690e-02 -0.001494674
## 1510 -0.001593391 -0.007800901 0.0005703029  6.296553e-05  0.004794133
## 1511 -0.001559983  0.005873106 0.0034787710 -5.444351e-03  0.002242761
##              PC18 5       PC19 5       PC20 5       PC21 5       PC22 5
## 1509 -0.016051523 -0.006675178 -0.018022127  0.007203784 -0.019176731
## 1510 -0.004775511  0.005446684 -0.007470543  0.001271042  0.025941426
## 1511 -0.008486666  0.001518778 -0.014608831 -0.003832421 -0.005724615
##              PC23 5       PC24 5       PC25 5       PC26 5       PC27 5
## 1509 -0.007305708  0.006855543  0.002783232 -0.0098704812 -0.008933310
## 1510 -0.025523894 -0.008248756  0.001846599  0.0065872166  0.005099990
## 1511 -0.008286145 -0.028598478 -0.002248187  0.0003763508  0.002782878
##              PC28 5       PC1 6        PC2 6        PC3 6        PC4 6
## 1509 -0.020129490 -0.001416287 0.004241126 -0.0009128507  0.015700062
## 1510  0.004724048  0.011482678 0.014761153 -0.0237087656  0.023693820
## 1511  0.011042670 -0.040610101 0.007063308 -0.0050588623 -0.005803994
##              PC5 6        PC6 6        PC7 6        PC8 6        PC9 6
## 1509 -0.008862347  0.001637617 1.259021e-02 -0.009178728 -0.003052368
## 1510 -0.005142817 -0.014307589 2.612038e-02 -0.009207667 -0.004313322
## 1511  0.001776928  0.009451272 3.440913e-05 -0.002195585  0.009831925
##              PC10 6       PC11 6       PC12 6       PC13 6       PC14 6
## 1509 -0.007321505 -0.005872727  0.010918354 -0.001593391 -0.007800901
## 1510  0.003300975 -0.011626549 -0.001014387 -0.001559983  0.005873106
## 1511 -0.007563371 -0.004323873  0.006104061 -0.000109934  0.000471144
##              PC15 6       PC16 6       PC17 6       PC18 6       PC19 6
## 1509 0.0005703029  6.296553e-05 0.004794133 -0.004775511  0.005446684
## 1510 0.0034787710 -5.444351e-03 0.002242761 -0.008486666  0.001518778
## 1511 0.0028843607  3.752110e-03 0.011407774  0.001820215 -0.012742466
##              PC20 6       PC21 6       PC22 6       PC23 6       PC24 6
## 1509 -0.007470543  0.001271042  0.025941426 -0.025523894 -0.0082487561
## 1510 -0.014608831 -0.003832421 -0.005724615 -0.008286145 -0.0285984782
## 1511 -0.018272500  0.004649245 -0.008030968 -0.002642501 -0.0001858499
##              PC25 6       PC26 6       PC27 6       PC28 6       PC1 7
## 1509  0.001846599  0.0065872166  0.005099990 0.004724048  0.0114826785
## 1510 -0.002248187  0.0003763508  0.002782878 0.011042670 -0.0406101008
## 1511 -0.009538100 -0.0049314803 -0.014736477 0.009430792  0.0006971848
##              PC2 7        PC3 7        PC4 7        PC5 7        PC6 7
## 1509 0.014761153 -0.023708766  0.023693820 -0.005142817 -0.014307589
## 1510 0.007063308 -0.005058862 -0.005803994  0.001776928  0.009451272
## 1511 0.004949799 -0.002908378 -0.022196382  0.002948824 -0.002113150
##              PC7 7        PC8 7        PC9 7        PC10 7       PC11 7
## 1509  2.612038e-02 -0.009207667 -0.004313322  0.003300975 -0.011626549
```

9

```
## 1510  3.440913e-05 -0.002195585  0.009831925 -0.007563371 -0.004323873
## 1511 -2.883009e-03 -0.003683337 -0.001798375 -0.003885031  0.006414103
##              PC12 7         PC13 7        PC14 7       PC15 7        PC16 7
## 1509 -0.001014387 -0.0015599830  0.005873106 0.003478771 -0.005444351
## 1510  0.006104061 -0.0001099340  0.000471144 0.002884361  0.003752110
## 1511  0.001059135  0.0005170681 -0.003757143 0.011017346 -0.007144393
##              PC17 7         PC18 7        PC19 7       PC20 7        PC21 7
## 1509  0.002242761 -0.008486666  0.001518778 -0.014608831 -0.003832421
## 1510  0.011407774  0.001820215 -0.012742466 -0.018272500  0.004649245
## 1511 -0.016416621 -0.019848419  0.011185883 -0.009897617  0.009974976
##              PC22 7         PC23 7        PC24 7        PC25 7         PC26 7
## 1509 -0.005724615 -0.008286145 -0.0285984782 -0.002248187  0.0003763508
## 1510 -0.008030968 -0.002642501 -0.0001858499 -0.009538100 -0.0049314803
## 1511 -0.002005528  0.003973156 -0.0120656167  0.001667109 -0.0050381355
##              PC27 7        PC28 7         PC1 8        PC2 8         PC3 8
## 1509  0.0027828782 0.0110426703 -0.0406101008  0.007063308 -0.005058862
## 1510 -0.0147364769 0.0094307920  0.0006971848  0.004949799 -0.002908378
## 1511  0.0006577285 0.0001124401 -0.0223379603 -0.005434499  0.017354255
##              PC4 8        PC5 8         PC6 8         PC7 8        PC8 8
## 1509 -0.005803994 0.001776928  9.451272e-03  3.440913e-05 -0.002195585
## 1510 -0.022196382 0.002948824 -2.113150e-03 -2.883009e-03 -0.003683337
## 1511 -0.006266218 0.005604233  3.661724e-05 -2.454902e-03  0.006739581
##              PC9 8         PC10 8        PC11 8        PC12 8         PC13 8
## 1509  0.009831925 -0.007563371 -0.004323873  0.006104061 -0.0001099340
## 1510 -0.001798375 -0.003885031  0.006414103  0.001059135  0.0005170681
## 1511 -0.010230827 -0.008258316  0.007439587 -0.012477030 -0.0023669379
##              PC14 8         PC15 8        PC16 8        PC17 8         PC18 8
## 1509  0.000471144  0.0028843607  0.003752110  1.140777e-02  0.0018202154
## 1510 -0.003757143  0.0110173461 -0.007144393 -1.641662e-02 -0.0198484188
## 1511 -0.004895413 -0.0007786634 -0.007153073  2.885395e-05 -0.0005792268
##              PC19 8        PC20 8       PC21 8       PC22 8        PC23 8
## 1509 -0.01274247 -0.018272500 0.004649245 -0.008030968 -0.002642501
## 1510  0.01118588 -0.009897617 0.009974976 -0.002005528  0.003973156
## 1511 -0.00205206 -0.006158545 0.010644265 -0.004601773 -0.002793200
##              PC24 8        PC25 8       PC26 8        PC27 8        PC28 8
## 1509 -0.0001858499 -0.009538100 -0.004931480 -0.0147364769  0.0094307920
## 1510 -0.0120656167  0.001667109 -0.005038136  0.0006577285  0.0001124401
## 1511 -0.0006114723 -0.002155581 -0.001840327  0.0012968471 -0.0023063435
##              PC1 9         PC2 9         PC3 9         PC4 9        PC5 9
## 1509  0.0006971848  0.004949799 -0.002908378 -0.022196382 0.002948824
## 1510 -0.0223379603 -0.005434499  0.017354255 -0.006266218 0.005604233
## 1511 -0.0325672272 -0.039582365  0.007201216  0.023257768 0.011949848
##              PC6 9         PC7 9         PC8 9         PC9 9        PC10 9
## 1509 -2.113150e-03 -0.002883009 -0.003683337 -0.001798375 -0.003885031
## 1510  3.661724e-05 -0.002454902  0.006739581 -0.010230827 -0.008258316
## 1511  1.011911e-02  0.024765196  0.004335667  0.018638940  0.002826788
##              PC11 9        PC12 9        PC13 9        PC14 9        PC15 9
## 1509 0.006414103  0.001059135  0.0005170681 -0.003757143  0.0110173461
## 1510 0.007439587 -0.012477030 -0.0023669379 -0.004895413 -0.0007786634
## 1511 0.006685497  0.007347207  0.0117909943 -0.019714795  0.0183050473
##              PC16 9        PC17 9         PC18 9       PC19 9        PC20 9
## 1509 -0.007144393 -1.641662e-02 -0.0198484188  0.01118588 -0.009897617
## 1510 -0.007153073  2.885395e-05 -0.0005792268 -0.00205206 -0.006158545
## 1511 -0.025657487  2.259494e-02  0.0094782892  0.03116980  0.017619594
```

```
##           PC21 9        PC22 9        PC23 9        PC24 9        PC25 9
## 1509 0.009974976 -0.002005528  0.003973156 -0.0120656167  0.001667109
## 1510 0.010644265 -0.004601773 -0.002793200 -0.0006114723 -0.002155581
## 1511 0.037655224  0.022855371 -0.007216075 -0.0414988478  0.041161154
##           PC26 9        PC27 9        PC28 9       PC1 10        PC2 10
## 1509 -0.005038136  0.0006577285  0.0001124401 -0.02233796 -0.0054344989
## 1510 -0.001840327  0.0012968471 -0.0023063435 -0.03256723 -0.0395823650
## 1511 -0.010790677 -0.0328340129  0.0106831917  0.01475429  0.0007729452
##           PC3 10       PC4 10       PC5 10       PC6 10       PC7 10
## 1509 0.0173542552 -0.006266218 0.005604233  3.661724e-05 -0.002454902
## 1510 0.0072012158  0.023257768 0.011949848  1.011911e-02  0.024765196
## 1511 0.0008867995 -0.011944946 0.001898384 -3.905557e-03  0.022675013
##           PC8 10       PC9 10       PC10 10      PC11 10      PC12 10
## 1509 0.006739581 -0.010230827 -0.008258316 0.007439587 -0.012477030
## 1510 0.004335667  0.018638940  0.002826788 0.006685497  0.007347207
## 1511 0.007937022 -0.009431923 -0.003475627 0.014923201  0.026502154
##           PC13 10       PC14 10       PC15 10       PC16 10       PC17 10
## 1509 -0.002366938 -0.004895413 -0.0007786634 -0.007153073  2.885395e-05
## 1510  0.011790994 -0.019714795  0.0183050473 -0.025657487  2.259494e-02
## 1511  0.012435494 -0.001427158  0.0048830407 -0.005864621 -8.655848e-03
##           PC18 10       PC19 10       PC20 10      PC21 10       PC22 10
## 1509 -0.0005792268 -0.002052060 -0.006158545 0.01064426 -0.004601773
## 1510  0.0094782892  0.031169797  0.017619594 0.03765522  0.022855371
## 1511 -0.0154584128 -0.006884752 -0.016438329 0.01145228  0.001467423
##           PC23 10       PC24 10       PC25 10      PC26 10       PC27 10
## 1509 -0.002793200 -0.0006114723 -0.002155581 -0.001840327  0.001296847
## 1510 -0.007216075 -0.0414988478  0.041161154 -0.010790677 -0.032834013
## 1511  0.022349932  0.0016204186  0.008445150 -0.012421274 -0.002385801
##           PC28 10       PC1 11        PC2 11       PC3 11        PC4 11
## 1509 -0.002306343 -0.03256723 -0.0395823650 0.0072012158  0.023257768
## 1510  0.010683192  0.01475429  0.0007729452 0.0008867995 -0.011944946
## 1511 -0.001984763 -0.10755555 -0.0130173736 0.0036846754  0.003881108
##           PC5 11       PC6 11      PC7 11      PC8 11       PC9 11
## 1509 0.011949848  0.010119115 0.02476520 0.004335667  0.018638940
## 1510 0.001898384 -0.003905557 0.02267501 0.007937022 -0.009431923
## 1511 0.010430631 -0.016943819 0.01510777 0.021371696 -0.008894898
##           PC10 11      PC11 11      PC12 11      PC13 11      PC14 11
## 1509  0.002826788 0.006685497  0.007347207 0.011790994 -0.019714795
## 1510 -0.003475627 0.014923201  0.026502154 0.012435494 -0.001427158
## 1511  0.013821131 0.012780445 -0.011953487 0.001878665 -0.003998521
##           PC15 11      PC16 11       PC17 11       PC18 11       PC19 11
## 1509 0.018305047 -0.025657487  0.022594940  0.009478289  0.031169797
## 1510 0.004883041 -0.005864621 -0.008655848 -0.015458413 -0.006884752
## 1511 0.003175079  0.005622566 -0.004502257 -0.007179949 -0.009537796
##           PC20 11      PC21 11      PC22 11       PC23 11      PC24 11
## 1509  0.017619594 0.037655224 0.022855371 -0.007216075 -0.041498848
## 1510 -0.016438329 0.011452283 0.001467423  0.022349932  0.001620419
## 1511  0.006013651 0.007061559 0.015935602 -0.003429659  0.002044646
##           PC25 11      PC26 11       PC27 11       PC28 11        PC1 12
## 1509  0.04116115 -0.010790677 -0.0328340129  0.010683192  0.0147542904
## 1510  0.00844515 -0.012421274 -0.0023858008 -0.001984763 -0.1075555510
## 1511 -0.00134329 -0.006655399 -0.0007309261 -0.015348757  0.0006917378
##           PC2 12        PC3 12       PC4 12       PC5 12       PC6 12
## 1509  0.0007729452 0.0008867995 -0.011944946 0.001898384 -0.003905557
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## 1510 -0.0130173736 0.0036846754  0.003881108 0.010430631 -0.016943819
## 1511 -0.0169356115 0.0167462427 -0.002013056 0.003227407  0.009560365
##              PC7 12        PC8 12        PC9 12       PC10 12       PC11 12
## 1509  0.022675013  0.007937022 -0.009431923 -0.003475627 0.014923201
## 1510  0.015107771  0.021371696 -0.008894898  0.013821131 0.012780445
## 1511 -0.005167355 -0.003778033 -0.002441691 -0.021062949 0.004186117
##             PC12 12       PC13 12       PC14 12       PC15 12       PC16 12
## 1509  0.02650215  0.012435494 -0.001427158  0.004883041 -0.005864621
## 1510 -0.01195349  0.001878665 -0.003998521  0.003175079  0.005622566
## 1511 -0.00257887 -0.002483389  0.001769505 -0.005365724 -0.000887370
##             PC17 12       PC18 12       PC19 12       PC20 12       PC21 12
## 1509 -0.008655848 -0.015458413 -0.006884752 -0.016438329  0.011452283
## 1510 -0.004502257 -0.007179949 -0.009537796  0.006013651  0.007061559
## 1511  0.003876797  0.011235110  0.011965157  0.002611066 -0.007588813
##             PC22 12       PC23 12       PC24 12       PC25 12       PC26 12
## 1509 0.001467423  0.022349932  0.001620419  0.008445150 -0.012421274
## 1510 0.015935602 -0.003429659  0.002044646 -0.001343290 -0.006655399
## 1511 0.006149516  0.010967748 -0.011545594  0.006975221 -0.011831812
##             PC27 12       PC28 12        PC1 13       PC2 13       PC3 13
## 1509 -0.0023858008 -0.001984763 -0.1075555510 -0.01301737 0.003684675
## 1510 -0.0007309261 -0.015348757  0.0006917378 -0.01693561 0.016746243
## 1511  0.0025671631  0.005794038  0.0166786388  0.01001182 0.013522066
##              PC4 13        PC5 13        PC6 13        PC7 13        PC8 13
## 1509  0.003881108  0.010430631 -0.016943819  0.015107771  0.021371696
## 1510 -0.002013056  0.003227407  0.009560365 -0.005167355 -0.003778033
## 1511  0.019656896 -0.001019778 -0.007926727  0.022193430 -0.025991041
##              PC9 13       PC10 13       PC11 13       PC12 13       PC13 13
## 1509 -0.008894898  0.013821131 0.012780445 -0.01195349  0.001878665
## 1510 -0.002441691 -0.021062949 0.004186117 -0.00257887 -0.002483389
## 1511  0.013055889  0.001999238 0.009704129  0.00282905  0.008468646
##             PC14 13       PC15 13       PC16 13       PC17 13       PC18 13
## 1509 -0.003998521  0.003175079  0.005622566 -0.004502257 -0.007179949
## 1510  0.001769505 -0.005365724 -0.000887370  0.003876797  0.011235110
## 1511  0.014785000  0.007241770 -0.015624990 -0.008962605 -0.010182896
##             PC19 13       PC20 13       PC21 13       PC22 13       PC23 13
## 1509 -0.009537796  0.006013651  0.007061559  0.015935602 -0.003429659
## 1510  0.011965157  0.002611066 -0.007588813  0.006149516  0.010967748
## 1511 -0.010840985 -0.008575891  0.016810809 -0.004655549 -0.015040271
##             PC24 13       PC25 13       PC26 13        PC27 13       PC28 13
## 1509  0.002044646 -0.001343290 -0.006655399 -0.0007309261 -0.015348757
## 1510 -0.011545594  0.006975221 -0.011831812  0.0025671631  0.005794038
## 1511  0.023177339 -0.006387271 -0.019411815 -0.0125732438 -0.006054273
##              PC1 14        PC2 14       PC3 14        PC4 14        PC5 14
## 1509 0.0006917378 -0.01693561  0.01674624 -0.0020130561  0.003227407
## 1510 0.0166786388  0.01001182  0.01352207  0.0196568963 -0.001019778
## 1511 0.0046716573  0.01233563 -0.00862878 -0.0009226998  0.021624292
##              PC6 14        PC7 14        PC8 14        PC9 14       PC10 14
## 1509  0.0095603654 -0.005167355 -0.003778033 -0.002441691 -0.021062949
## 1510 -0.0079267272  0.022193430 -0.025991041  0.013055889  0.001999238
## 1511  0.0002252759 -0.027458014 -0.003274913 -0.003277076  0.019105072
##             PC11 14       PC12 14       PC13 14       PC14 14       PC15 14
## 1509 0.004186117 -0.00257887 -0.002483389 0.001769505 -0.005365724
## 1510 0.009704129  0.00282905  0.008468646 0.014785000  0.007241770
## 1511 0.002823104 -0.01452471  0.015559023 0.018019061  0.019016355
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12

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##           PC16 14       PC17 14       PC18 14       PC19 14       PC20 14
## 1509 -0.000887370  0.003876797  0.011235110  0.011965157  0.002611066
## 1510 -0.015624990 -0.008962605 -0.010182896 -0.010840985 -0.008575891
## 1511  0.002763323 -0.013488207  0.002164792  0.002616665 -0.009537479
##           PC21 14       PC22 14       PC23 14       PC24 14       PC25 14
## 1509 -0.007588813  0.006149516  0.010967748 -0.011545594  0.006975221
## 1510  0.016810809 -0.004655549 -0.015040271  0.023177339 -0.006387271
## 1511  0.028417415 -0.004986738  0.003892606  0.001456397  0.003802765
##           PC26 14       PC27 14       PC28 14        PC1 15        PC2 15
## 1509 -0.01183181  0.0025671631  0.005794038 0.016678639  0.01001182
## 1510 -0.01941182 -0.0125732438 -0.006054273 0.004671657  0.01233563
## 1511 -0.01625548  0.0008472881 -0.002321438 0.059390909 -0.01062631
##            PC3 15        PC4 15        PC5 15         PC6 15        PC7 15
## 1509  0.01352207  0.0196568963 -0.001019778 -0.0079267272  0.022193430
## 1510 -0.00862878 -0.0009226998  0.021624292  0.0002252759 -0.027458014
## 1511  0.01930995 -0.0075793563  0.009611132  0.0200190287 -0.009466856
##            PC8 15        PC9 15       PC10 15       PC11 15       PC12 15
## 1509 -0.025991041  0.013055889 0.001999238  0.009704129  0.00282905
## 1510 -0.003274913 -0.003277076 0.019105072  0.002823104 -0.01452471
## 1511 -0.010275745  0.004362803 0.009576415 -0.009487231 -0.02299266
##           PC13 15     PC14 15       PC15 15       PC16 15       PC17 15
## 1509 0.008468646 0.01478500 7.241770e-03 -0.015624990 -0.008962605
## 1510 0.015559023 0.01801906 1.901636e-02  0.002763323 -0.013488207
## 1511 0.009339684 0.03568539 3.638892e-05 -0.015147539  0.013775371
##           PC18 15       PC19 15       PC20 15       PC21 15       PC22 15
## 1509 -0.010182896 -0.010840985 -0.008575891  0.016810809 -0.004655549
## 1510  0.002164792  0.002616665 -0.009537479  0.028417415 -0.004986738
## 1511  0.020571166 -0.006372710 -0.025315169 -0.009290717 -0.016816002
##           PC23 15     PC24 15       PC25 15       PC26 15        PC27 15
## 1509 -0.015040271 0.023177339 -0.006387271 -0.019411815 -0.0125732438
## 1510  0.003892606 0.001456397  0.003802765 -0.016255482  0.0008472881
## 1511  0.014443440 0.011465353  0.004737427  0.002723325 -0.0087918389
##           PC28 15       PC1 16       PC2 16       PC3 16         PC4 16
## 1509 -0.006054273 0.004671657  0.012335628 -0.00862878 -0.0009226998
## 1510 -0.002321438 0.059390909 -0.010626311  0.01930995 -0.0075793563
## 1511 -0.006650289 0.038991181 -0.007335976 -0.01488896 -0.0328831808
##           PC5 16         PC6 16        PC7 16        PC8 16        PC9 16
## 1509 0.021624292  0.0002252759 -0.027458014 -0.003274913 -0.003277076
## 1510 0.009611132  0.0200190287 -0.009466856 -0.010275745  0.004362803
## 1511 0.007764454 -0.0053175438 -0.012192284 -0.003748014 -0.018589085
##           PC10 16       PC11 16      PC12 16       PC13 16     PC14 16
## 1509  0.019105072  0.002823104 -0.01452471  0.015559023 0.01801906
## 1510  0.009576415 -0.009487231 -0.02299266  0.009339684 0.03568539
## 1511 -0.003019143  0.001938409 -0.01064592 -0.001030180 0.02176162
##           PC15 16       PC16 16       PC17 16       PC18 16        PC19 16
## 1509  1.901636e-02  0.002763323 -0.013488207  0.002164792  0.002616665
## 1510  3.638892e-05 -0.015147539  0.013775371  0.020571166 -0.006372710
## 1511 -2.605496e-02 -0.013225717  0.007741725 -0.006963117 -0.024574906
##           PC20 16       PC21 16       PC22 16        PC23 16      PC24 16
## 1509 -0.009537479  0.028417415 -0.004986738  0.0038926061 1.456397e-03
## 1510 -0.025315169 -0.009290717 -0.016816002  0.0144434398 1.146535e-02
## 1511 -0.018603488  0.022910004 -0.002874325 -0.0008859662 9.322361e-05
##           PC25 16       PC26 16       PC27 16       PC28 16       PC1 17
## 1509 0.003802765 -0.016255482  0.0008472881 -0.002321438 0.0593909091
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13

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## 1510 0.004737427  0.002723325 -0.0087918389 -0.006650289 0.0389911807
## 1511 0.007885284 -0.008714395 -0.0164258929 -0.005982716 0.0001419295
##              PC2 17       PC3 17       PC4 17       PC5 17       PC6 17
## 1509 -0.010626311  0.019309951 -0.007579356 0.009611132  0.020019029
## 1510 -0.007335976 -0.014888963 -0.032883181 0.007764454 -0.005317544
## 1511  0.014244209 -0.009915653  0.001403316 0.006148947  0.005755861
##              PC7 17       PC8 17       PC9 17      PC10 17      PC11 17
## 1509 -0.009466856 -0.010275745  0.004362803  0.009576415 -0.009487231
## 1510 -0.012192284 -0.003748014 -0.018589085 -0.003019143  0.001938409
## 1511  0.018038603 -0.017210713 -0.016474749 -0.008307271  0.003659817
##              PC12 17      PC13 17      PC14 17      PC15 17      PC16 17
## 1509 -0.022992656  0.009339684  0.03568539  3.638892e-05 -0.01514754
## 1510 -0.010645923 -0.001030180  0.02176162 -2.605496e-02 -0.01322572
## 1511  0.003294069 -0.001041002 -0.01228180 -5.177771e-03 -0.01035133
##              PC17 17      PC18 17      PC19 17      PC20 17      PC21 17
## 1509 0.013775371  0.020571166 -0.00637271 -0.025315169 -0.009290717
## 1510 0.007741725 -0.006963117 -0.02457491 -0.018603488  0.022910004
## 1511 0.003383606 -0.010949902 -0.00382999 -0.003797499 -0.008919130
##              PC22 17      PC23 17       PC24 17      PC25 17      PC26 17
## 1509 -0.016816002  0.0144434398  1.146535e-02  0.004737427  0.0027233249
## 1510 -0.002874325 -0.0008859662  9.322361e-05  0.007885284 -0.0087143947
## 1511  0.020859546 -0.0025608484 -1.474009e-02 -0.004222247  0.0003306759
##              PC27 17      PC28 17       PC1 18       PC2 18       PC3 18
## 1509 -0.008791839 -0.006650289  0.0389911807 -0.007335976 -0.014888963
## 1510 -0.016425893 -0.005982716  0.0001419295  0.014244209 -0.009915653
## 1511  0.018271818  0.004312166 -0.0067054636  0.003121867  0.026159707
##              PC4 18       PC5 18       PC6 18       PC7 18       PC8 18
## 1509 -0.032883181 0.007764454 -0.005317544 -0.0121922843 -0.003748014
## 1510  0.001403316 0.006148947  0.005755861  0.0180386029 -0.017210713
## 1511  0.005742527 0.003561480  0.008027052  0.0003587363  0.008263792
##              PC9 18      PC10 18      PC11 18      PC12 18      PC13 18
## 1509 -0.01858908 -0.003019143 0.001938409 -0.010645923 -0.001030180
## 1510 -0.01647475 -0.008307271 0.003659817  0.003294069 -0.001041002
## 1511 -0.01206798  0.002238354 0.005447292 -0.003518302  0.008581998
##              PC14 18      PC15 18      PC16 18      PC17 18      PC18 18
## 1509  0.021761619 -0.026054959 -0.01322572  0.007741725 -0.0069631174
## 1510 -0.012281803 -0.005177771 -0.01035133  0.003383606 -0.0109499019
## 1511  0.009262373  0.002234200 -0.01871560 -0.000191252 -0.0005853322
##              PC19 18      PC20 18      PC21 18      PC22 18      PC23 18
## 1509 -0.024574906 -0.018603488  0.022910004 -0.002874325 -0.0008859662
## 1510 -0.003829990 -0.003797499 -0.008919130  0.020859546 -0.0025608484
## 1511 -0.004303104 -0.003661931  0.005204025 -0.024179618 -0.0018937830
##              PC24 18      PC25 18      PC26 18      PC27 18      PC28 18
## 1509  9.322361e-05  0.007885284 -0.0087143947 -0.01642589 -0.005982716
## 1510 -1.474009e-02 -0.004222247  0.0003306759  0.01827182  0.004312166
## 1511 -7.458179e-03  0.017603357 -0.0045452880 -0.02001569 -0.001359961
##               PC1 19       PC2 19       PC3 19       PC4 19       PC5 19
## 1509  0.0001419295  0.014244209 -0.009915653  0.001403316 0.006148947
## 1510 -0.0067054636  0.003121867  0.026159707  0.005742527 0.003561480
## 1511  0.0371064095 -0.007999378 -0.004486272 -0.014910344 0.001544421
##               PC6 19       PC7 19       PC8 19       PC9 19      PC10 19
## 1509  0.005755861 0.0180386029 -0.017210713 -0.01647475 -0.008307271
## 1510  0.008027052 0.0003587363  0.008263792 -0.01206798  0.002238354
## 1511 -0.019837973 0.0108622092 -0.017657973  0.01541550  0.031967755
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##           PC11 19      PC12 19       PC13 19       PC14 19        PC15 19
## 1509 0.003659817  0.003294069 -0.001041002 -0.012281803 -0.0051777713
## 1510 0.005447292 -0.003518302  0.008581998  0.009262373  0.0022342004
## 1511 0.005079846 -0.013112941  0.002844316  0.009677850 -0.0006005622
##           PC16 19     PC17 19       PC18 19      PC19 19        PC20 19
## 1509 -0.01035133  0.003383606 -0.0109499019 -0.003829990 -0.003797499
## 1510 -0.01871560 -0.000191252 -0.0005853322 -0.004303104 -0.003661931
## 1511  0.00550034  0.021556173  0.0194767416  0.001416373 -0.009969678
##           PC21 19     PC22 19       PC23 19      PC24 19        PC25 19
## 1509 -0.008919130  0.02085955 -0.002560848 -0.014740085 -0.004222247
## 1510  0.005204025 -0.02417962 -0.001893783 -0.007458179  0.017603357
## 1511 -0.018905602  0.01024241  0.011202653 -0.011380339 -0.019044340
##            PC26 19       PC27 19      PC28 19       PC1 20        PC2 20
## 1509  0.0003306759  0.0182718184  0.004312166 -0.006705464  0.003121867
## 1510 -0.0045452880 -0.0200156899 -0.001359961  0.037106409 -0.007999378
## 1511  0.0056346164 -0.0008275499 -0.007489222 -0.041336512  0.003659940
##            PC3 20       PC4 20      PC5 20       PC6 20        PC7 20
## 1509  0.026159707  0.005742527 0.003561480  0.008027052 0.0003587363
## 1510 -0.004486272 -0.014910344 0.001544421 -0.019837973 0.0108622092
## 1511  0.004543443  0.019172336 0.004697253  0.008680835 0.0035778844
##            PC8 20      PC9 20       PC10 20      PC11 20       PC12 20
## 1509  0.008263792 -0.01206798  0.002238354 0.005447292 -0.003518302
## 1510 -0.017657973  0.01541550  0.031967755 0.005079846 -0.013112941
## 1511 -0.013407112  0.00213372 -0.003396122 0.013822973 -0.005559394
##            PC13 20       PC14 20      PC15 20       PC16 20       PC17 20
## 1509  0.0085819983  0.009262373  0.0022342004 -0.018715605 -0.000191252
## 1510  0.0028443162  0.009677850 -0.0006005622  0.005500340  0.021556173
## 1511 -0.0007456293 -0.013078063 -0.0052382347  0.003630475 -0.005377417
##            PC18 20       PC19 20      PC20 20       PC21 20       PC22 20
## 1509 -0.0005853322 -0.004303104 -0.003661931  0.005204025 -0.024179618
## 1510  0.0194767416  0.001416373 -0.009969678 -0.018905602  0.010242413
## 1511  0.0037098369  0.007369195 -0.005960241  0.004586506  0.006397151
##            PC23 20       PC24 20      PC25 20       PC26 20       PC27 20
## 1509 -0.001893783 -0.007458179  0.017603357 -0.004545288 -0.0200156899
## 1510  0.011202653 -0.011380339 -0.019044340  0.005634616 -0.0008275499
## 1511 -0.001486784 -0.005901033 -0.001596011 -0.005986229  0.0094014515
##            PC28 20      PC1 21       PC2 21       PC3 21       PC4 21
## 1509 -0.001359961  0.03710641 -0.007999378 -0.004486272 -0.014910344
## 1510 -0.007489222 -0.04133651  0.003659940  0.004543443  0.019172336
## 1511 -0.010681396 -0.02236972 -0.008866283 -0.004378774 -0.002617433
##            PC5 21      PC6 21       PC7 21      PC8 21      PC9 21
## 1509 0.001544421 -0.019837973 0.010862209 -0.01765797 0.015415500
## 1510 0.004697253  0.008680835 0.003577884 -0.01340711 0.002133720
## 1511 0.015597306  0.003208600 0.013541171  0.01077757 0.008784604
##            PC10 21      PC11 21      PC12 21       PC13 21       PC14 21
## 1509  0.031967755 0.005079846 -0.013112941  0.0028443162  0.00967785
## 1510 -0.003396122 0.013822973 -0.005559394 -0.0007456293 -0.01307806
## 1511  0.016902332 0.011018167 -0.003746386  0.0046658409  0.01821817
##            PC15 21      PC16 21      PC17 21       PC18 21       PC19 21
## 1509 -0.0006005622  0.005500340  0.021556173  0.019476742  0.0014163728
## 1510 -0.0052382347  0.003630475 -0.005377417  0.003709837  0.0073691955
## 1511 -0.0004985749 -0.018087734  0.011772696 -0.010628096 -0.0006505963
##            PC20 21       PC21 21      PC22 21       PC23 21      PC24 21
## 1509 -0.009969678 -0.0189056020  0.010242413  0.0112026534 -0.011380339
```

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## 1510 -0.005960241  0.0045865061  0.006397151 -0.0014867842 -0.005901033
## 1511  0.002115042  0.0001018014 -0.002919210  0.0001013272  0.003456662
##              PC25 21       PC26 21       PC27 21       PC28 21       PC1 22
## 1509 -0.019044340  0.005634616 -0.0008275499 -0.007489222 -0.041336512
## 1510 -0.001596011 -0.005986229  0.0094014515 -0.010681396 -0.022369718
## 1511  0.001437436  0.011699250 -0.0158337512  0.003934321  0.005478809
##              PC2 22        PC3 22        PC4 22       PC5 22        PC6 22
## 1509  0.003659940  0.004543443  0.019172336 0.004697253  0.008680835
## 1510 -0.008866283 -0.004378774 -0.002617433 0.015597306  0.003208600
## 1511 -0.008258957  0.026491663 -0.008619068 0.027213001 -0.008595147
##              PC7 22        PC8 22        PC9 22       PC10 22     PC11 22
## 1509 0.0035778844 -0.0134071116  0.002133720 -0.003396122 0.01382297
## 1510 0.0135411715  0.0107775710  0.008784604  0.016902332 0.01101817
## 1511 0.0007381581 -0.0004430259 -0.003946893 -0.004721844 0.02151467
##              PC12 22       PC13 22       PC14 22       PC15 22       PC16 22
## 1509 -0.005559394 -0.0007456293 -0.013078063 -0.0052382347  0.003630475
## 1510 -0.003746386  0.0046658409  0.018218167 -0.0004985749 -0.018087734
## 1511 -0.004051054  0.0012937078  0.005303002 -0.0052095853 -0.006607459
##              PC17 22       PC18 22       PC19 22       PC20 22       PC21 22
## 1509 -0.005377417  0.003709837  0.0073691955 -0.005960241  0.0045865061
## 1510  0.011772696 -0.010628096 -0.0006505963  0.002115042  0.0001018014
## 1511 -0.009515495  0.013033831  0.0055720768 -0.003927433 -0.0052316402
##              PC22 22       PC23 22       PC24 22       PC25 22       PC26 22
## 1509  0.006397151 -0.0014867842 -0.005901033 -0.001596011 -0.005986229
## 1510 -0.002919210  0.0001013272  0.003456662  0.001437436  0.011699250
## 1511 -0.026370237  0.0099098084 -0.001694635  0.004625309 -0.010902051
##              PC27 22       PC28 22        PC1 23       PC2 23        PC3 23
## 1509  0.009401451 -0.010681396 -0.022369718 -0.008866283 -0.004378774
## 1510 -0.015833751  0.003934321  0.005478809 -0.008258957  0.026491663
## 1511 -0.002532754  0.004800822 -0.020378069  0.020154248 -0.012338661
##              PC4 23        PC5 23        PC6 23       PC7 23        PC8 23
## 1509 -0.0026174332  0.01559731  0.003208600 0.0135411715  0.0107775710
## 1510 -0.0086190683  0.02721300 -0.008595147 0.0007381581 -0.0004430259
## 1511 -0.0007669631 -0.01700638 -0.007063044 0.0229339482  0.0033900092
##              PC9 23        PC10 23       PC11 23       PC12 23       PC13 23
## 1509  0.008784604  0.016902332 0.01101817 -0.003746386 0.004665841
## 1510 -0.003946893 -0.004721844 0.02151467 -0.004051054 0.001293708
## 1511  0.030383991  0.002146460 0.02274453  0.050256447 0.005230995
##              PC14 23       PC15 23       PC16 23       PC17 23       PC18 23
## 1509  0.018218167 -0.0004985749 -0.018087734  0.0117726962 -0.010628096
## 1510  0.005303002 -0.0052095853 -0.006607459 -0.0095154952  0.013033831
## 1511 -0.013923806  0.0063410602  0.010235858  0.0004915789 -0.002208324
##              PC19 23       PC20 23       PC21 23       PC22 23       PC23 23
## 1509 -0.0006505963  0.002115042  0.0001018014 -0.00291921 0.0001013272
## 1510  0.0055720768 -0.003927433 -0.0052316402 -0.02637024 0.0099098084
## 1511 -0.0251496846 -0.003965611 -0.0104051080  0.03437062 0.0039658805
##              PC24 23       PC25 23       PC26 23       PC27 23       PC28 23
## 1509  0.003456662 0.001437436  0.011699250 -0.015833751 0.003934321
## 1510 -0.001694635 0.004625309 -0.010902051 -0.002532754 0.004800822
## 1511  0.013028958 0.000802489  0.003747006  0.008813623 0.002955712
##              PC1 24        PC2 24        PC3 24        PC4 24        PC5 24
## 1509  0.005478809 -0.008258957  0.02649166 -0.0086190683  0.027213001
## 1510 -0.020378069  0.020154248 -0.01233866 -0.0007669631 -0.017006382
## 1511  0.049372509  0.003470129 -0.02179635 -0.0027015443 -0.009622586
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##            PC6 24      PC7 24        PC8 24       PC9 24       PC10 24
## 1509 -0.008595147 0.0007381581 -0.0004430259 -0.003946893 -0.004721844
## 1510 -0.007063044 0.0229339482  0.0033900092  0.030383991  0.002146460
## 1511  0.003780254 0.0037379223  0.0187368524 -0.005200330  0.008571661
##           PC11 24      PC12 24     PC13 24      PC14 24      PC15 24
## 1509  0.021514665 -0.004051054 0.001293708  0.005303002 -0.005209585
## 1510  0.022744526  0.050256447 0.005230995 -0.013923806  0.006341060
## 1511 -0.005920207  0.005504817 0.008652201 -0.011578109  0.032746286
##           PC16 24      PC17 24      PC18 24      PC19 24      PC20 24
## 1509 -0.006607459 -0.0095154952  0.013033831  0.005572077 -0.003927433
## 1510  0.010235858  0.0004915789 -0.002208324 -0.025149685 -0.003965611
## 1511  0.012394474 -0.0005477199  0.002645252  0.026097710 -0.020889260
##           PC21 24      PC22 24     PC23 24      PC24 24     PC25 24
## 1509 -0.00523164 -0.026370237 0.009909808 -0.001694635 0.004625309
## 1510 -0.01040511  0.034370623 0.003965880  0.013028958 0.000802489
## 1511  0.01021324 -0.005450475 0.005759301 -0.008836479 0.002731186
##            PC26 24      PC27 24      PC28 24       PC1 25       PC2 25
## 1509 -0.0109020514 -0.002532754  0.004800822 -0.02037807  0.020154248
## 1510  0.0037470055  0.008813623  0.002955712  0.04937251  0.003470129
## 1511  0.0003107558 -0.009125847 -0.004579031  0.01113013 -0.006527259
##            PC3 25       PC4 25       PC5 25       PC6 25       PC7 25
## 1509 -0.01233866 -0.0007669631 -0.017006382 -0.007063044  0.022933948
## 1510 -0.02179635 -0.0027015443 -0.009622586  0.003780254  0.003737922
## 1511  0.00790451  0.0006251002  0.001622984  0.001831925 -0.010263668
##           PC8 25      PC9 25      PC10 25      PC11 25      PC12 25
## 1509  0.003390009  0.03038399 0.002146460  0.022744526  0.050256447
## 1510  0.018736852 -0.00520033 0.008571661 -0.005920207  0.005504817
## 1511 -0.003459432  0.01170175 0.008432631 -0.008584799 -0.005546757
##           PC13 25      PC14 25     PC15 25      PC16 25       PC17 25
## 1509  0.005230995 -0.013923806  0.00634106 0.010235858  0.0004915789
## 1510  0.008652201 -0.011578109  0.03274629 0.012394474 -0.0005477199
## 1511 -0.004318639 -0.001881149 -0.00236544 0.003622442  0.0046035932
##           PC18 25      PC19 25      PC20 25     PC21 25      PC22 25
## 1509 -0.002208324 -0.025149685 -0.003965611 -0.01040511  0.034370623
## 1510  0.002645252  0.026097710 -0.020889260  0.01021324 -0.005450475
## 1511 -0.003792445 -0.004704078  0.014705961 -0.01855679  0.001899609
##           PC23 25      PC24 25      PC25 25      PC26 25      PC27 25
## 1509 0.003965880  0.013028958  0.000802489 0.0037470055  0.008813623
## 1510 0.005759301 -0.008836479  0.002731186 0.0003107558 -0.009125847
## 1511 0.011526742  0.012314037 -0.006130839 0.0068064749  0.003754347
##           PC28 25       PC1 26      PC2 26       PC3 26        PC4 26
## 1509  0.002955712 0.04937251  0.003470129 -0.0217963535 -0.0027015443
## 1510 -0.004579031 0.01113013 -0.006527259  0.0079045103  0.0006251002
## 1511  0.002437452 0.02154110  0.005842437 -0.0002195843  0.0012842507
##           PC5 26       PC6 26       PC7 26       PC8 26        PC9 26
## 1509 -0.009622586  0.003780254  0.003737922  0.018736852 -0.0052003297
## 1510  0.001622984  0.001831925 -0.010263668 -0.003459432  0.0117017548
## 1511  0.003983048 -0.006030786 -0.008408324 -0.008054809  0.0007308089
##          PC10 26      PC11 26      PC12 26       PC13 26      PC14 26
## 1509 0.008571661 -0.005920207  0.005504817  0.0086522008 -0.011578109
## 1510 0.008432631 -0.008584799 -0.005546757 -0.0043186387 -0.001881149
## 1511 0.011946726  0.002452289 -0.003875000  0.0007948522 -0.001227945
##          PC15 26      PC16 26       PC17 26      PC18 26      PC19 26
## 1509  0.032746286 0.012394474 -0.0005477199  0.002645252  0.026097710
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17

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## 1510 -0.002365440 0.003622442  0.0046035932 -0.003792445 -0.004704078
## 1511  0.001087821 0.003811862  0.0078616871  0.009308955 -0.008074010
##            PC20 26      PC21 26      PC22 26      PC23 26      PC24 26
## 1509 -0.020889260  0.0102132390 -0.005450475  0.005759301 -0.008836479
## 1510  0.014705961 -0.0185567915  0.001899609  0.011526742  0.012314037
## 1511  0.006581666 -0.0001362417  0.004979965 -0.002556183  0.003663722
##            PC25 26      PC26 26      PC27 26      PC28 26       PC1 27
## 1509  0.002731186 0.0003107558 -0.009125847 -0.0045790311  0.011130132
## 1510 -0.006130839 0.0068064749  0.003754347  0.0024374517  0.021541098
## 1511 -0.009064283 0.0106946214  0.005280844 -0.0009233622 -0.009447108
##             PC2 27       PC3 27       PC4 27       PC5 27       PC6 27
## 1509 -0.006527259  0.0079045103 0.0006251002 0.001622984  0.001831925
## 1510  0.005842437 -0.0002195843 0.0012842507 0.003983048 -0.006030786
## 1511 -0.001418480  0.0024921009 0.0036304714 0.005164242  0.008514786
##             PC7 27       PC8 27       PC9 27      PC10 27      PC11 27
## 1509 -0.010263668 -0.003459432  0.0117017548 0.008432631 -0.008584799
## 1510 -0.008408324 -0.008054809  0.0007308089 0.011946726  0.002452289
## 1511  0.006825826 -0.006548601 -0.0020236349 0.012918412 -0.000375717
##            PC12 27      PC13 27      PC14 27      PC15 27      PC16 27
## 1509 -0.005546757 -4.318639e-03 -0.001881149 -0.002365440  0.003622442
## 1510 -0.003875000  7.948522e-04 -0.001227945  0.001087821  0.003811862
## 1511 -0.005382228  1.486327e-05 -0.005918648  0.009751769 -0.001408190
##            PC17 27      PC18 27      PC19 27      PC20 27      PC21 27
## 1509 0.004603593 -0.003792445 -0.004704078 0.0147059609 -0.0185567915
## 1510 0.007861687  0.009308955 -0.008074010 0.0065816661 -0.0001362417
## 1511 0.012752442 -0.018483186  0.009779467 0.0007370782 -0.0014645550
##            PC22 27      PC23 27      PC24 27      PC25 27      PC26 27
## 1509  1.899609e-03  0.011526742  0.012314037 -0.006130839 0.006806475
## 1510  4.979965e-03 -0.002556183  0.003663722 -0.009064283 0.010694621
## 1511 -6.906762e-05 -0.016263183 -0.001134552 -0.004840421 0.007381927
##            PC27 27      PC28 27       PC1 28       PC2 28       PC3 28
## 1509 0.003754347  0.0024374517  0.021541098  0.005842437 -0.0002195843
## 1510 0.005280844 -0.0009233622 -0.009447108 -0.001418480  0.0024921009
## 1511 0.001064150 -0.0029778766  0.077412603 -0.004534782  0.0057693849
##             PC4 28       PC5 28       PC6 28       PC7 28       PC8 28
## 1509 0.001284251 0.003983048 -0.006030786 -0.008408324 -0.0080548089
## 1510 0.003630471 0.005164242  0.008514786  0.006825826 -0.0065486008
## 1511 0.004651229 0.017306888 -0.015052576 -0.002283031  0.0007929753
##             PC9 28      PC10 28      PC11 28      PC12 28      PC13 28
## 1509  0.0007308089 0.01194673  0.002452289 -0.003875000 7.948522e-04
## 1510 -0.0020236349 0.01291841 -0.000375717 -0.005382228 1.486327e-05
## 1511 -0.0164812313 0.01514321 -0.012168305  0.015767640 1.443415e-02
##            PC14 28      PC15 28      PC16 28      PC17 28      PC18 28
## 1509 -0.001227945 0.001087821  0.003811862  0.007861687  0.009308955
## 1510 -0.005918648 0.009751769 -0.001408190  0.012752442 -0.018483186
## 1511  0.010686339 0.008107711  0.008954117 -0.003532744  0.011288209
##            PC19 28      PC20 28      PC21 28       PC22 28      PC23 28
## 1509 -0.008074010  0.0065816661 -0.0001362417  4.979965e-03 -0.002556183
## 1510  0.009779467  0.0007370782 -0.0014645550 -6.906762e-05 -0.016263183
## 1511  0.008722578 -0.0062580844  0.0065513528 -1.218969e-02 -0.007810659
##            PC24 28      PC25 28      PC26 28      PC27 28       PC28 28
## 1509  0.003663722 -0.009064283  0.010694621  0.005280844 -0.0009233622
## 1510 -0.001134552 -0.004840421  0.007381927  0.001064150 -0.0029778766
## 1511  0.005468229  0.004977657 -0.004601017 -0.003432031 -0.0009728480
```

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##              PC1 29         PC2 29        PC3 29        PC4 29       PC5 29
## 1509 -0.009447108 -0.001418480  0.002492101 0.003630471 0.005164242
## 1510  0.077412603 -0.004534782  0.005769385 0.004651229 0.017306888
## 1511  0.013133948 -0.010630645 -0.005349471 0.007107567 0.006223110
##             PC6 29        PC7 29        PC8 29        PC9 29       PC10 29
## 1509  0.008514786  0.006825826 -0.0065486008 -0.002023635  0.012918412
## 1510 -0.015052576 -0.002283031  0.0007929753 -0.016481231  0.015143211
## 1511  0.014872864 -0.004072456 -0.0044201825  0.003702641 -0.003701052
##            PC11 29       PC12 29       PC13 29       PC14 29      PC15 29
## 1509 -0.000375717 -0.005382228 1.486327e-05 -0.005918648  0.009751769
## 1510 -0.012168305  0.015767640 1.443415e-02  0.010686339  0.008107711
## 1511 -0.020805305  0.003533583 1.833970e-03  0.012081261 -0.015401362
##            PC16 29       PC17 29       PC18 29      PC19 29       PC20 29
## 1509 -0.001408190  0.012752442 -0.018483186  0.009779467  0.0007370782
## 1510  0.008954117 -0.003532744  0.011288209  0.008722578 -0.0062580844
## 1511 -0.010919692  0.012157779 -0.003354396 -0.015084016 -0.0111746583
##            PC21 29       PC22 29       PC23 29      PC24 29       PC25 29
## 1509 -0.001464555 -6.906762e-05 -0.016263183 -0.001134552 -0.004840421
## 1510  0.006551353 -1.218969e-02 -0.007810659  0.005468229  0.004977657
## 1511  0.004321477  1.339088e-02 -0.007352513  0.006031136 -0.010986398
##            PC26 29       PC27 29       PC28 29       PC1 30       PC2 30
## 1509  0.007381927  0.001064150 -0.002977877 0.07741260 -0.004534782
## 1510 -0.004601017 -0.003432031 -0.000972848 0.01313395 -0.010630645
## 1511 -0.003753174 -0.005011288 -0.004713115 0.03146817  0.013746791
##             PC3 30       PC4 30       PC5 30        PC6 30       PC7 30
## 1509  0.005769385  0.004651229  0.01730689 -0.015052576 -0.002283031
## 1510 -0.005349471  0.007107567  0.00622311  0.014872864 -0.004072456
## 1511 -0.013420429 -0.013538500 -0.01468329 -0.009201358  0.002762433
##              PC8 30        PC9 30       PC10 30       PC11 30      PC12 30
## 1509  0.0007929753 -0.0164812313  0.015143211 -0.012168305 0.015767640
## 1510 -0.0044201825  0.0037026408 -0.003701052 -0.020805305 0.003533583
## 1511  0.0104561239  0.0003366414  0.017214754  0.006682797 0.001062188
##           PC13 30     PC14 30      PC15 30       PC16 30       PC17 30
## 1509 0.014434148 0.010686339  0.008107711  0.008954117 -0.003532744
## 1510 0.001833970 0.012081261 -0.015401362 -0.010919692  0.012157779
## 1511 0.006775546 0.007658738  0.048983875  0.001635968 -0.008996781
##            PC18 30      PC19 30      PC20 30       PC21 30      PC22 30
## 1509  0.011288209  0.008722578 -0.006258084  0.0065513528 -0.01218969
## 1510 -0.003354396 -0.015084016 -0.011174658  0.0043214768  0.01339088
## 1511 -0.033441260  0.024182573 -0.015136126 -0.0005463799  0.01710197
##            PC23 30      PC24 30      PC25 30       PC26 30        PC27 30
## 1509 -0.007810659  0.005468229  0.004977657 -0.004601017 -0.0034320314
## 1510 -0.007352513  0.006031136 -0.010986398 -0.003753174 -0.0050112875
## 1511 -0.014001879 -0.008892490  0.006233526  0.004752607 -0.0005748972
##            PC28 30       PC1 31       PC2 31        PC3 31       PC4 31
## 1509 -0.000972848  0.013133948 -0.01063065 -0.005349471  0.007107567
## 1510 -0.004713115  0.031468165  0.01374679 -0.013420429 -0.013538500
## 1511 -0.003195953 -0.006426227 -0.01716419  0.009839777 -0.007925043
##            PC5 31       PC6 31       PC7 31        PC8 31       PC9 31
## 1509  0.006223110  0.014872864 -0.004072456 -0.004420183 0.0037026408
## 1510 -0.014683285 -0.009201358  0.002762433  0.010456124 0.0003366414
## 1511 -0.002296384  0.013493555  0.001684530 -0.008413847 0.0070424784
##            PC10 31       PC11 31      PC12 31       PC13 31      PC14 31
## 1509 -0.003701052 -0.020805305 0.003533583 0.0018339698 0.0120812607
```

```
## 1510  0.017214754   0.006682797 0.001062188 0.0067755462 0.0076587382
## 1511 -0.005076004   0.004393433 0.003828574 0.0003430734 0.0001418819
##           PC15 31       PC16 31      PC17 31       PC18 31      PC19 31
## 1509 -0.01540136 -0.010919692  0.012157779 -0.003354396 -0.01508402
## 1510  0.04898387  0.001635968 -0.008996781 -0.033441260  0.02418257
## 1511  0.01189467 -0.012449567  0.006319844 -0.002780813  0.00935080
##           PC20 31       PC21 31      PC22 31       PC23 31      PC24 31
## 1509 -0.011174658  0.0043214768  0.0133908843 -0.007352513  0.006031136
## 1510 -0.015136126 -0.0005463799  0.0171019701 -0.014001879 -0.008892490
## 1511  0.005843575  0.0040587999 -0.0001966901 -0.001435993 -0.021464687
##           PC25 31       PC26 31       PC27 31       PC28 31
## 1509 -0.010986398 -0.003753174 -0.0050112875 -0.004713115 1 0 0 0 0 0 0 0
## 1510  0.006233526  0.004752607 -0.0005748972 -0.003195953 1 0 0 0 0 0 0 0
## 1511  0.009729559  0.003905506 -0.0133072538 -0.002158126 1 0 0 0 0 0 0 0
##
## 1509 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## 1510 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## 1511 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```r
tail(pca_pred_all,3)
```

```
##                      PC1 1        PC2 1         PC3 1        PC4 1
## 2734  0.006424 -0.0490127010 0.011721922 -0.009106317 0.01603089
## 2735 -0.003191 -0.0006737413 0.001720288 -0.004018878 0.00250935
## 2736  0.000800 -0.0684868904 0.013966847  0.006676336 0.01756691
##             PC5 1         PC6 1         PC7 1        PC8 1         PC9 1
## 2734 -0.012175638 0.000521837 -1.202711e-06  0.006252491  0.006686505
## 2735 -0.001462157 0.005926103 -6.221693e-04 -0.008685236  0.010444941
## 2736 -0.011573446 0.007432371  6.182470e-03 -0.017499891 -0.002121539
##            PC10 1       PC11 1       PC12 1        PC13 1       PC14 1
## 2734 -0.012216864  0.015341047  0.049370906 -0.001764425 -0.018065108
## 2735  0.004755690  0.006026875 -0.017255693 -0.001226624 -0.002856041
## 2736  0.005014874 -0.017341341  0.008035298  0.013449561  0.004330025
##            PC15 1       PC16 1       PC17 1        PC18 1       PC19 1
## 2734 -0.008322432 -0.004401985 0.0009283809 -0.014984390 -0.029940962
## 2735  0.010990926  0.003183420 0.0120345353  0.002664094  0.007156911
## 2736  0.001138819 -0.023171717 0.0143119852 -0.004740485  0.003233069
##            PC20 1       PC21 1       PC22 1        PC23 1       PC24 1
## 2734 -0.005567857 -0.006662732 -0.006473272  0.0042658774  0.018103756
## 2735 -0.011178026  0.006516400 -0.002140912  0.0001872109 -0.002288651
## 2736  0.002115289 -0.012259438  0.004958136 -0.0030349553  0.012441731
##            PC25 1       PC26 1       PC27 1        PC28 1         PC1 2
## 2734 -0.004191591 0.008474603  0.017850443 -0.0036104584 -0.0006737413
## 2735  0.013224247 0.001411225 -0.004001749 -0.0007336368 -0.0684868904
## 2736  0.008031054 0.007185556 -0.003007357 -0.0067705280 -0.0164305202
##            PC2 2        PC3 2        PC4 2        PC5 2        PC6 2
## 2734  0.001720288 -0.004018878  0.00250935 -0.001462157  0.005926103
## 2735  0.013966847  0.006676336  0.01756691 -0.011573446  0.007432371
## 2736 -0.018373046  0.002733122 -0.02013586 -0.008649141 -0.002757069
##            PC7 2         PC8 2        PC9 2        PC10 2       PC11 2
## 2734 -0.0006221693 -0.008685236  0.010444941  0.004755690  0.006026875
## 2735  0.0061824696 -0.017499891 -0.002121539  0.005014874 -0.017341341
## 2736  0.0051734476  0.008750797  0.003803827 -0.006972734  0.009152431
##            PC12 2       PC13 2       PC14 2       PC15 2       PC16 2
```

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## 2734 -0.017255693 -0.001226624 -0.002856041  0.010990926  0.00318342
## 2735  0.008035298  0.013449561  0.004330025  0.001138819 -0.02317172
## 2736  0.002595821 -0.003876993  0.006367084 -0.001312024 -0.01220896
##            PC17 2       PC18 2       PC19 2       PC20 2       PC21 2
## 2734 0.01203454  0.002664094  0.007156911 -0.011178026  0.006516400
## 2735 0.01431199 -0.004740485  0.003233069  0.002115289 -0.012259438
## 2736 0.01864019 -0.003187470 -0.018245892 -0.001297623 -0.006294554
##            PC22 2       PC23 2       PC24 2       PC25 2       PC26 2
## 2734 -0.002140912  0.0001872109 -0.002288651  0.013224247 1.411225e-03
## 2735  0.004958136 -0.0030349553  0.012441731  0.008031054 7.185556e-03
## 2736  0.003884561  0.0145426411  0.006572444 -0.008158810 4.907659e-05
##            PC27 2       PC28 2       PC1 3       PC2 3       PC3 3
## 2734 -0.004001749 -0.0007336368 -0.06848689  0.01396685  0.006676336
## 2735 -0.003007357 -0.0067705280 -0.01643052 -0.01837305  0.002733122
## 2736  0.004557322  0.0043840559  0.08535361 -0.01663982 -0.001406563
##            PC4 3       PC5 3       PC6 3       PC7 3       PC8 3
## 2734  0.01756691 -0.011573446  0.007432371 0.006182470 -0.017499891
## 2735 -0.02013586 -0.008649141 -0.002757069 0.005173448  0.008750797
## 2736 -0.02217713  0.007626846  0.002389863 0.005476850 -0.005512757
##            PC9 3       PC10 3       PC11 3       PC12 3       PC13 3
## 2734 -0.002121539  0.005014874 -0.017341341  0.008035298  0.0134495606
## 2735  0.003803827 -0.006972734  0.009152431  0.002595821 -0.0038769934
## 2736  0.005103720  0.001182571  0.008823077 -0.005417992 -0.0002750342
##            PC14 3       PC15 3       PC16 3       PC17 3       PC18 3
## 2734 0.004330025  0.001138819 -0.0231717167  0.014311985 -0.004740485
## 2735 0.006367084 -0.001312024 -0.0122089589  0.018640188 -0.003187470
## 2736 0.009939972  0.012659667  0.0008521185 -0.005464336  0.012643873
##            PC19 3       PC20 3       PC21 3       PC22 3       PC23 3
## 2734  0.0032330689  0.002115289 -0.012259438  0.004958136 -0.003034955
## 2735 -0.0182458924 -0.001297623 -0.006294554  0.003884561  0.014542641
## 2736  0.0009963786 -0.001968537  0.004786117 -0.002252287  0.006037966
##            PC24 3       PC25 3       PC26 3       PC27 3       PC28 3
## 2734  0.012441731  0.008031054  7.185556e-03 -0.003007357 -0.006770528
## 2735  0.006572444 -0.008158810  4.907659e-05  0.004557322  0.004384056
## 2736 -0.008830316  0.004141033 -1.088701e-02 -0.012322407  0.008112920
##            PC1 4       PC2 4       PC3 4       PC4 4       PC5 4
## 2734 -0.01643052 -0.0183730460  0.0027331216 -0.020135864 -0.008649141
## 2735  0.08535361 -0.0166398154 -0.0014065634 -0.022177135  0.007626846
## 2736  0.01021159 -0.0009338762  0.0003942238  0.007935615 -0.008988312
##            PC6 4       PC7 4       PC8 4       PC9 4       PC10 4
## 2734 -0.002757069  0.005173448  0.008750797  0.003803827 -0.006972734
## 2735  0.002389863  0.005476850 -0.005512757  0.005103720  0.001182571
## 2736 -0.007164389 -0.008130172  0.011365216 -0.012259977 -0.004127998
##            PC11 4       PC12 4       PC13 4       PC14 4       PC15 4
## 2734  0.009152431  0.002595821 -0.0038769934  0.0063670841 -0.001312024
## 2735  0.008823077 -0.005417992 -0.0002750342  0.0099399716  0.012659667
## 2736 -0.002911252 -0.007386137  0.0018874417 -0.0005347412  0.016255900
##            PC16 4       PC17 4       PC18 4       PC19 4       PC20 4
## 2734 -0.0122089589  1.864019e-02 -0.003187470 -0.0182458924 -0.0012976226
## 2735  0.0008521185 -5.464336e-03  0.012643873  0.0009963786 -0.0019685371
## 2736 -0.0040642806 -7.906855e-05 -0.007454902  0.0168135796  0.0008913899
##            PC21 4       PC22 4       PC23 4       PC24 4       PC25 4
## 2734 -0.006294554  0.003884561  0.014542641  0.006572444 -0.008158810
## 2735  0.004786117 -0.002252287  0.006037966 -0.008830316  0.004141033
```

```
## 2736   0.010200515 -0.003372265 -0.002442734  0.010000051 -0.014431531
##                 PC26 4        PC27 4        PC28 4         PC1 5         PC2 5
## 2734  4.907659e-05  0.004557322  0.004384056  0.08535361 -0.0166398154
## 2735 -1.088701e-02 -0.012322407  0.008112920  0.01021159 -0.0009338762
## 2736  6.337186e-03 -0.007690036 -0.009187806 -0.01371819  0.0056264993
##                  PC3 5         PC4 5         PC5 5         PC6 5         PC7 5
## 2734 -0.0014065634 -0.022177135  0.007626846  0.002389863  0.005476850
## 2735  0.0003942238  0.007935615 -0.008988312 -0.007164389 -0.008130172
## 2736  0.0049632149 -0.012970002 -0.010919831 -0.005099910  0.006752876
##                  PC8 5         PC9 5        PC10 5        PC11 5        PC12 5
## 2734 -0.005512757  0.00510372  0.001182571  0.008823077 -0.005417992
## 2735  0.011365216 -0.01225998 -0.004127998 -0.002911252 -0.007386137
## 2736  0.001992133 -0.02536580  0.017743128  0.002114359  0.006207332
##                 PC13 5        PC14 5       PC15 5        PC16 5        PC17 5
## 2734 -0.0002750342  0.0099399716 0.012659667  0.0008521185 -5.464336e-03
## 2735  0.0018874417 -0.0005347412 0.016255900 -0.0040642806 -7.906855e-05
## 2736  0.0109778243  0.0054037603 0.006939594  0.0117759400  1.361080e-03
##                 PC18 5        PC19 5        PC20 5        PC21 5        PC22 5
## 2734  0.0126438729 0.0009963786 -0.0019685371  4.786117e-03 -0.002252287
## 2735 -0.0074549019 0.0168135796  0.0008913899  1.020052e-02 -0.003372265
## 2736  0.0009060561 0.0009837956  0.0001669664 -8.070896e-05  0.008062552
##                 PC23 5        PC24 5        PC25 5        PC26 5        PC27 5
## 2734  0.006037966 -0.008830316  0.004141033 -0.010887006 -0.012322407
## 2735 -0.002442734  0.010000051 -0.014431531  0.006337186 -0.007690036
## 2736 -0.008202219 -0.008526578 -0.015892510 -0.011633470  0.007103490
##                 PC28 5         PC1 6         PC2 6        PC3 6         PC4 6
## 2734  0.008112920  0.01021159 -0.0009338762 0.0003942238  0.007935615
## 2735 -0.009187806 -0.01371819  0.0056264993 0.0049632149 -0.012970002
## 2736  0.001312406 -0.06585199  0.0132812343 0.0028802905 -0.002856721
##                  PC5 6         PC6 6         PC7 6         PC8 6         PC9 6
## 2734 -0.008988312 -0.007164389 -0.008130172  0.011365216 -0.012259977
## 2735 -0.010919831 -0.005099910  0.006752876  0.001992133 -0.025365805
## 2736 -0.008513501 -0.016076488  0.007193355 -0.008130445  0.007070827
##                 PC10 6        PC11 6        PC12 6        PC13 6        PC14 6
## 2734 -0.004127998 -0.002911252 -0.007386137 0.001887442 -0.0005347412
## 2735  0.017743128  0.002114359  0.006207332 0.010977824  0.0054037603
## 2736  0.003146986 -0.005023455 -0.005400786 0.004134144 -0.0038843448
##                 PC15 6        PC16 6        PC17 6         PC18 6        PC19 6
## 2734 0.016255900 -0.004064281 -7.906855e-05 -0.0074549019 0.0168135796
## 2735 0.006939594  0.011775940  1.361080e-03  0.0009060561 0.0009837956
## 2736 0.022129828  0.004100527  1.466444e-03 -0.0091468110 0.0259808943
##                 PC20 6        PC21 6        PC22 6        PC23 6        PC24 6
## 2734  0.0008913899  1.020052e-02 -0.003372265 -0.0024427336  0.010000051
## 2735  0.0001669664 -8.070896e-05  0.008062552 -0.0082022187 -0.008526578
## 2736 -0.0009482420 -3.145334e-03 -0.013429021 -0.0005442246  0.006184752
##                 PC25 6        PC26 6        PC27 6        PC28 6         PC1 7
## 2734 -0.0144315309  0.0063371860 -0.007690036 -0.009187806 -0.01371819
## 2735 -0.0158925100 -0.0116334704  0.007103490  0.001312406 -0.06585199
## 2736 -0.0007208193  0.0009797139 -0.010070827 -0.002087394  0.07631556
##                  PC2 7         PC3 7         PC4 7         PC5 7         PC6 7
## 2734  0.005626499 0.004963215 -0.012970002 -0.010919831 -0.005099910
## 2735  0.013281234 0.002880290 -0.002856721 -0.008513501 -0.016076488
## 2736 -0.007539883 0.020033224 -0.008948315 -0.001345905  0.009226234
##                  PC7 7         PC8 7         PC9 7        PC10 7        PC11 7
```

```
## 2734 0.006752876  0.001992133 -0.025365805  0.017743128  0.002114359
## 2735 0.007193355 -0.008130445  0.007070827  0.003146986 -0.005023455
## 2736 0.003181901 -0.004637656  0.001109030 -0.007607809  0.006620502
##           PC12 7        PC13 7        PC14 7       PC15 7       PC16 7
## 2734  0.006207332  0.010977824  0.005403760  0.006939594 0.011775940
## 2735 -0.005400786  0.004134144 -0.003884345  0.022129828 0.004100527
## 2736  0.002654276 -0.001539409  0.007075281 -0.009380420 0.005171050
##           PC17 7        PC18 7        PC19 7        PC20 7        PC21 7
## 2734 0.001361080  0.0009060561  0.0009837956  1.669664e-04 -8.070896e-05
## 2735 0.001466444 -0.0091468110  0.0259808943 -9.482420e-04 -3.145334e-03
## 2736 0.003872991  0.0159915533 -0.0130671951 -1.399934e-05 -3.703885e-03
##           PC22 7        PC23 7        PC24 7        PC25 7        PC26 7
## 2734  0.008062552 -0.0082022187 -0.008526578 -0.0158925100 -0.0116334704
## 2735 -0.013429021 -0.0005442246  0.006184752 -0.0007208193  0.0009797139
## 2736  0.015188443 -0.0085429176  0.006641887 -0.0152453292 -0.0099010576
##           PC27 7        PC28 7       PC1 8        PC2 8        PC3 8
## 2734  0.007103490  0.0013124063 -0.06585199  0.013281234  0.002880290
## 2735 -0.010070827 -0.0020873941  0.07631556 -0.007539883  0.020033224
## 2736  0.003748472 -0.0004992336 -0.04284368  0.004631065 -0.001156504
##           PC4 8        PC5 8        PC6 8       PC7 8        PC8 8
## 2734 -0.002856721 -0.008513501 -0.016076488 0.007193355 -0.008130445
## 2735 -0.008948315 -0.001345905  0.009226234 0.003181901 -0.004637656
## 2736  0.002959745 -0.003481249  0.002629424 0.001445123 -0.006466144
##           PC9 8        PC10 8        PC11 8        PC12 8        PC13 8
## 2734  0.007070827  0.0031469863 -0.005023455 -0.005400786  0.0041341439
## 2735  0.001109030 -0.0076078092  0.006620502  0.002654276 -0.0015394093
## 2736 -0.003474538 -0.0007833781 -0.002246157  0.003225924  0.0002471427
##           PC14 8        PC15 8        PC16 8       PC17 8        PC18 8
## 2734 -0.003884345  0.022129828  0.0041005274 0.001466444 -0.009146811
## 2735  0.007075281 -0.009380420  0.0051710497 0.003872991  0.015991553
## 2736 -0.002087563 -0.005412447 -0.0003631236 0.006052028 -0.002988366
##           PC19 8        PC20 8        PC21 8        PC22 8        PC23 8
## 2734  0.025980894 -9.482420e-04 -0.003145334 -0.013429021 -0.0005442246
## 2735 -0.013067195 -1.399934e-05 -0.003703885  0.015188443 -0.0085429176
## 2736 -0.005847325 -6.855101e-04 -0.002059013 -0.008666921  0.0057731716
##           PC24 8        PC25 8        PC26 8        PC27 8        PC28 8
## 2734  6.184752e-03 -0.0007208193  0.0009797139 -0.010070827 -0.0020873941
## 2735  6.641887e-03 -0.0152453292 -0.0099010576  0.003748472 -0.0004992336
## 2736 -5.848382e-05  0.0017403452  0.0050784135 -0.004483161  0.0034744121
##           PC1 9        PC2 9        PC3 9        PC4 9        PC5 9
## 2734  0.076315563 -0.007539883  0.020033224 -0.008948315 -0.001345905
## 2735 -0.042843677  0.004631065 -0.001156504  0.002959745 -0.003481249
## 2736 -0.001060734 -0.002952646  0.013735301  0.008082869  0.006874804
##           PC6 9       PC7 9        PC8 9        PC9 9        PC10 9
## 2734 0.009226234  0.003181901 -0.004637656  0.001109030 -0.0076078092
## 2735 0.002629424  0.001445123 -0.006466144 -0.003474538 -0.0007833781
## 2736 0.006061125 -0.010811546  0.011086711  0.011642481 -0.0147559600
##           PC11 9        PC12 9        PC13 9        PC14 9       PC15 9
## 2734  0.006620502  0.002654276 -0.0015394093  0.007075281 -0.009380420
## 2735 -0.002246157  0.003225924  0.0002471427 -0.002087563 -0.005412447
## 2736 -0.001624066 -0.007844990 -0.0055676275  0.003813645 -0.011662183
##           PC16 9       PC17 9        PC18 9        PC19 9        PC20 9
## 2734  0.0051710497  0.003872991  0.015991553 -0.013067195 -1.399934e-05
## 2735 -0.0003631236  0.006052028 -0.002988366 -0.005847325 -6.855101e-04
```

```
## 2736   0.0012493952 -0.010720672 -0.005603644  0.003795799  1.121028e-02
##              PC21 9        PC22 9        PC23 9        PC24 9        PC25 9
## 2734 -0.003703885  0.015188443 -0.008542918  6.641887e-03 -0.015245329
## 2735 -0.002059013 -0.008666921  0.005773172 -5.848382e-05  0.001740345
## 2736 -0.004539256  0.004944062  0.010405430  4.111548e-03 -0.008480917
##              PC26 9        PC27 9        PC28 9         PC1 10        PC2 10
## 2734 -0.009901058  0.003748472 -0.0004992336 -0.042843677  0.004631065
## 2735  0.005078413 -0.004483161  0.0034744121 -0.001060734 -0.002952646
## 2736 -0.002308142 -0.004709010 -0.0067711163 -0.018115420  0.003610325
##              PC3 10        PC4 10        PC5 10        PC6 10        PC7 10
## 2734 -0.001156504 0.002959745 -0.003481249 0.002629424  0.001445123
## 2735  0.013735301 0.008082869  0.006874804 0.006061125 -0.010811546
## 2736  0.006734166 0.008819304  0.009188599 0.012418278  0.006381323
##              PC8 10        PC9 10       PC10 10       PC11 10       PC12 10
## 2734 -0.006466144 -0.003474538 -0.0007833781 -0.002246157  0.003225924
## 2735  0.011086711  0.011642481 -0.0147559600 -0.001624066 -0.007844990
## 2736 -0.006857635 -0.005081442 -0.0070125648  0.009719815 -0.004974004
##             PC13 10       PC14 10       PC15 10       PC16 10       PC17 10
## 2734  0.0002471427 -0.002087563 -0.0054124474 -0.0003631236  0.006052028
## 2735 -0.0055676275  0.003813645 -0.0116621833  0.0012493952 -0.010720672
## 2736 -0.0000592956 -0.006914699  0.0008479236  0.0012853926  0.013637849
##             PC18 10       PC19 10       PC20 10       PC21 10       PC22 10
## 2734 -0.002988366 -0.005847325 -0.0006855101 -0.002059013 -0.008666921
## 2735 -0.005603644  0.003795799  0.0112102766 -0.004539256  0.004944062
## 2736 -0.007812266 -0.013416508 -0.0079987537  0.008494259  0.005228179
##             PC23 10       PC24 10       PC25 10       PC26 10       PC27 10
## 2734 0.005773172 -5.848382e-05  0.001740345  0.005078413 -0.004483161
## 2735 0.010405430  4.111548e-03 -0.008480917 -0.002308142 -0.004709010
## 2736 0.008127219  1.450241e-02 -0.002154225  0.001813039 -0.007911200
##             PC28 10        PC1 11        PC2 11        PC3 11        PC4 11
## 2734  0.003474412 -0.001060734 -0.002952646 0.013735301  0.008082869
## 2735 -0.006771116 -0.018115420  0.003610325 0.006734166  0.008819304
## 2736  0.015655176  0.124588417 -0.008534137 0.005952285 -0.002354147
##              PC5 11        PC6 11        PC7 11        PC8 11        PC9 11
## 2734  0.006874804 0.006061125 -0.010811546  0.011086711  0.011642481
## 2735  0.009188599 0.012418278  0.006381323 -0.006857635 -0.005081442
## 2736 -0.004446780 0.000370606  0.004263423 -0.012515900 -0.012397286
##             PC10 11       PC11 11       PC12 11       PC13 11       PC14 11
## 2734 -0.014755960 -0.0016240656 -0.0078449903 -0.0055676275  0.003813645
## 2735 -0.007012565  0.0097198152 -0.0049740037 -0.0000592956 -0.006914699
## 2736 -0.000120460  0.0006332776 -0.0006698583 -0.0030299052  0.006495377
##             PC15 11       PC16 11       PC17 11       PC18 11       PC19 11
## 2734 -0.0116621833  0.001249395 -0.010720672 -0.005603644  0.003795799
## 2735  0.0008479236  0.001285393  0.013637849 -0.007812266 -0.013416508
## 2736 -0.0017910990 -0.002974262 -0.004457695  0.007590390 -0.004362515
##             PC20 11       PC21 11       PC22 11       PC23 11       PC24 11
## 2734  0.011210277 -0.004539256  0.004944062  0.010405430  0.0041115480
## 2735 -0.007998754  0.008494259  0.005228179  0.008127219  0.0145024093
## 2736 -0.003504332  0.011348030 -0.009725822 -0.017124394 -0.0006862934
##             PC25 11       PC26 11       PC27 11       PC28 11        PC1 12
## 2734 -0.008480917 -0.002308142 -0.00470901 -0.006771116 -0.01811542
## 2735 -0.002154225  0.001813039 -0.00791120  0.015655176  0.12458842
## 2736  0.004935688  0.007903265 -0.01484788 -0.002963229  0.07317580
##              PC2 12        PC3 12        PC4 12        PC5 12        PC6 12
```

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## 2734  0.003610325 0.006734166  0.008819304  0.009188599 0.012418278
## 2735 -0.008534137 0.005952285 -0.002354147 -0.004446780 0.000370606
## 2736  0.023563714 0.011503636  0.023413546  0.004595647 0.015489804
##              PC7 12       PC8 12       PC9 12      PC10 12       PC11 12
## 2734  0.0063813229 -0.006857635 -0.005081442 -0.0070125648  0.0097198152
## 2735  0.0042634233 -0.012515900 -0.012397286 -0.0001204600  0.0006332776
## 2736 -0.0009325537  0.003546614 -0.009512374 -0.0005927077 -0.0035644143
##             PC12 12      PC13 12      PC14 12      PC15 12      PC16 12
## 2734 -0.0049740037 -0.0000592956 -0.006914699  0.0008479236  0.001285393
## 2735 -0.0006698583 -0.0030299052  0.006495377 -0.0017910990 -0.002974262
## 2736 -0.0019502461  0.0025422251  0.019455348 -0.0108009529  0.004295532
##            PC17 12      PC18 12      PC19 12      PC20 12     PC21 12
## 2734  0.013637849 -0.007812266 -0.013416508 -0.007998754 0.008494259
## 2735 -0.004457695  0.007590390 -0.004362515 -0.003504332 0.011348030
## 2736 -0.013453177  0.010442741  0.005394147 -0.004371212 0.001534726
##            PC22 12      PC23 12       PC24 12      PC25 12     PC26 12
## 2734  0.005228179  0.008127219  0.0145024093 -0.002154225 0.001813039
## 2735 -0.009725822 -0.017124394 -0.0006862934  0.004935688 0.007903265
## 2736 -0.022089542 -0.021070750 -0.0145940097  0.018575711 0.013755469
##            PC27 12      PC28 12     PC1 13      PC2 13     PC3 13
## 2734 -0.00791120  0.0156551758 0.12458842 -0.0085341375 0.005952285
## 2735 -0.01484788 -0.0029632295 0.07317580  0.0235637139 0.011503636
## 2736 -0.01132938  0.0001316727 0.01722265  0.0002492609 0.015474291
##             PC4 13       PC5 13      PC6 13       PC7 13      PC8 13
## 2734 -0.002354147 -0.004446780 0.000370606  0.0042634233 -0.012515900
## 2735  0.023413546  0.004595647 0.015489804 -0.0009325537  0.003546614
## 2736 -0.001767364  0.002952352 0.001031221 -0.0028785042  0.012801937
##             PC9 13      PC10 13      PC11 13       PC12 13      PC13 13
## 2734 -0.012397286 -0.0001204600  0.0006332776 -0.0006698583 -0.003029905
## 2735 -0.009512374 -0.0005927077 -0.0035644143 -0.0019502461  0.002542225
## 2736  0.001126176  0.0018453415 -0.0011859356  0.0026150781  0.001920976
##           PC14 13      PC15 13       PC16 13      PC17 13     PC18 13
## 2734 0.006495377 -0.001791099 -2.974262e-03 -0.004457695 0.007590390
## 2735 0.019455348 -0.010800953  4.295532e-03 -0.013453177 0.010442741
## 2736 0.003014523 -0.004825138  3.125457e-05  0.001961375 0.002255604
##            PC19 13       PC20 13      PC21 13      PC22 13       PC23 13
## 2734 -0.004362515 -3.504332e-03  0.011348030 -0.009725822 -0.0171243938
## 2735  0.005394147 -4.371212e-03  0.001534726 -0.022089542 -0.0210707501
## 2736 -0.003715094 -1.087155e-05 -0.001323070  0.003156336  0.0007398872
##             PC24 13      PC25 13     PC26 13       PC27 13       PC28 13
## 2734 -0.0006862934 0.004935688 0.007903265 -0.0148478791 -0.0029632295
## 2735 -0.0145940097 0.018575711 0.013755469 -0.0113293825  0.0001316727
## 2736 -0.0024974952 0.004180842 0.006113976  0.0004095663  0.0025285158
##            PC1 14       PC2 14      PC3 14       PC4 14      PC5 14
## 2734  0.073175796 0.0235637139 0.011503636  0.023413546 0.004595647
## 2735  0.017222654 0.0002492609 0.015474291 -0.001767364 0.002952352
## 2736 -0.008695713 0.0001127371 0.006086611 -0.002158952 0.004724343
##            PC6 14       PC7 14      PC8 14      PC9 14      PC10 14
## 2734  0.015489804 -0.0009325537 0.003546614 -0.009512374 -0.0005927077
## 2735  0.001031221 -0.0028785042 0.012801937  0.001126176  0.0018453415
## 2736 -0.001337832  0.0008501681 0.004903129  0.008697179 -0.0074434911
##           PC11 14      PC12 14     PC13 14      PC14 14      PC15 14
## 2734 -0.003564414 -0.001950246  0.002542225 1.945535e-02 -0.010800953
## 2735 -0.001185936  0.002615078  0.001920976 3.014523e-03 -0.004825138
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25

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## 2736 -0.010380749 -0.002681775 -0.003248255 -8.133608e-05 -0.002500003
##            PC16 14      PC17 14      PC18 14      PC19 14       PC20 14
## 2734 4.295532e-03 -0.013453177 0.0104427409  0.005394147 -4.371212e-03
## 2735 3.125457e-05  0.001961375 0.0022556041 -0.003715094 -1.087155e-05
## 2736 3.413641e-03 -0.004663647 0.0003304726 -0.001214632 -1.722694e-03
##            PC21 14      PC22 14      PC23 14      PC24 14       PC25 14
## 2734  0.001534726 -0.022089542 -0.0210707501 -0.014594010  0.018575711
## 2735 -0.001323070  0.003156336  0.0007398872 -0.002497495  0.004180842
## 2736 -0.005907449  0.001531294 -0.0015335941 -0.002684391 -0.001876524
##            PC26 14      PC27 14      PC28 14       PC1 15        PC2 15
## 2734  0.013755469 -0.0113293825  0.0001316727  0.017222654  0.0002492609
## 2735  0.006113976  0.0004095663  0.0025285158 -0.008695713  0.0001127371
## 2736 -0.006493458  0.0072023449 -0.0025910826  0.009891795 -0.0053934969
##             PC3 15       PC4 15      PC5 15       PC6 15        PC7 15
## 2734  0.015474291 -0.001767364 0.002952352  0.001031221 -0.0028785042
## 2735  0.006086611 -0.002158952 0.004724343 -0.001337832  0.0008501681
## 2736 -0.003465009  0.018458781 0.012982214  0.007292678  0.0034528876
##             PC8 15       PC9 15      PC10 15       PC11 15       PC12 15
## 2734 0.0128019370 0.001126176  0.0018453415 -1.185936e-03  0.002615078
## 2735 0.0049031288 0.008697179 -0.0074434911 -1.038075e-02 -0.002681775
## 2736 0.0009784405 0.002651728  0.0002552333  8.192198e-05 -0.009064022
##            PC13 15      PC14 15      PC15 15       PC16 15       PC17 15
## 2734  0.001920976  3.014523e-03 -0.004825138  3.125457e-05  0.001961375
## 2735 -0.003248255 -8.133608e-05 -0.002500003  3.413641e-03 -0.004663647
## 2736  0.001364598  1.656800e-02 -0.013495009 -1.389294e-02  0.006067451
##            PC18 15      PC19 15      PC20 15       PC21 15      PC22 15
## 2734 0.0022556041 -0.003715094 -1.087155e-05 -0.001323070 0.003156336
## 2735 0.0003304726 -0.001214632 -1.722694e-03 -0.005907449 0.001531294
## 2736 0.0038661372  0.009378779 -1.053875e-02  0.018675143 0.006832749
##            PC23 15      PC24 15      PC25 15      PC26 15       PC27 15
## 2734  0.0007398872 -0.002497495  0.004180842  0.006113976 0.0004095663
## 2735 -0.0015335941 -0.002684391 -0.001876524 -0.006493458 0.0072023449
## 2736  0.0034521376  0.008946993 -0.019101380  0.015172273 0.0006969407
##            PC28 15       PC1 16       PC2 16       PC3 16        PC4 16
## 2734  0.002528516 -0.008695713  0.0001127371  0.006086611 -0.002158952
## 2735 -0.002591083  0.009891795 -0.0053934969 -0.003465009  0.018458781
## 2736  0.038002498  0.014192336  0.0136409504 -0.020894206  0.003190829
##             PC5 16       PC6 16       PC7 16        PC8 16       PC9 16
## 2734 0.004724343 -0.001337832  0.0008501681  0.0049031288 0.008697179
## 2735 0.012982214  0.007292678  0.0034528876  0.0009784405 0.002651728
## 2736 0.008667941  0.002687195 -0.0269112894 -0.0001620121 0.006106826
##            PC10 16       PC11 16       PC12 16      PC13 16       PC14 16
## 2734 -0.0074434911 -1.038075e-02 -0.0026817755 -0.003248255 -8.133608e-05
## 2735  0.0002552333  8.192198e-05 -0.0090640220  0.001364598  1.656800e-02
## 2736 -0.0113635637 -1.800021e-02  0.0009775351 -0.004525893  3.048895e-03
##            PC15 16      PC16 16      PC17 16       PC18 16      PC19 16
## 2734 -0.002500003  0.003413641 -0.004663647  0.0003304726 -0.001214632
## 2735 -0.013495009 -0.013892938  0.006067451  0.0038661372  0.009378779
## 2736  0.001846851  0.001551133 -0.007958399 -0.0078267032  0.009202174
##            PC20 16      PC21 16      PC22 16      PC23 16      PC24 16
## 2734 -0.001722694 -0.005907449  0.001531294 -0.001533594 -0.002684391
## 2735 -0.010538753  0.018675143  0.006832749  0.003452138  0.008946993
## 2736  0.005763859 -0.008086903 -0.004754573 -0.013657625 -0.003073428
##            PC25 16      PC26 16      PC27 16      PC28 16       PC1 17
```

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## 2734 -0.001876524 -6.493458e-03  0.0072023449 -0.002591083 0.009891795
## 2735 -0.019101380  1.517227e-02  0.0006969407  0.038002498 0.014192336
## 2736  0.010806554 -1.830437e-05 -0.0044320879 -0.015620801 0.005834737
##           PC2 17       PC3 17       PC4 17       PC5 17       PC6 17
## 2734 -0.005393497 -0.003465009 0.018458781 0.012982214 0.007292678
## 2735  0.013640950 -0.020894206 0.003190829 0.008667941 0.002687195
## 2736  0.001139935 -0.007179797 0.006584224 0.016100115 0.006890623
##           PC7 17       PC8 17       PC9 17      PC10 17        PC11 17
## 2734  0.003452888  0.0009784405 0.002651728  0.0002552333  8.192198e-05
## 2735 -0.026911289 -0.0001620121 0.006106826 -0.0113635637 -1.800021e-02
## 2736 -0.007742636 -0.0036631549 0.011260290 -0.0055580089 -7.537158e-03
##           PC12 17       PC13 17      PC14 17       PC15 17       PC16 17
## 2734 -0.0090640220  0.0013645980 0.016568003 -0.013495009 -0.013892938
## 2735  0.0009775351 -0.0045258930 0.003048895  0.001846851  0.001551133
## 2736  0.0076142048  0.0005826421 0.012737709  0.003020688 -0.004870965
##           PC17 17      PC18 17       PC19 17      PC20 17       PC21 17
## 2734  0.006067451  0.003866137  0.009378779 -0.010538753  0.018675143
## 2735 -0.007958399 -0.007826703  0.009202174  0.005763859 -0.008086903
## 2736 -0.004689251 -0.002352153 -0.002229670 -0.004523743  0.003882070
##           PC22 17      PC23 17       PC24 17      PC25 17       PC26 17
## 2734  0.006832749  0.003452138  0.008946993 -0.019101380  1.517227e-02
## 2735 -0.004754573 -0.013657625 -0.003073428  0.010806554 -1.830437e-05
## 2736 -0.006558041 -0.009786551 -0.002531478 -0.002298018 -5.241521e-04
##           PC27 17      PC28 17       PC1 18       PC2 18        PC3 18
## 2734  0.0006969407  0.0380024975 0.014192336 0.013640950 -0.020894206
## 2735 -0.0044320879 -0.0156208007 0.005834737 0.001139935 -0.007179797
## 2736  0.0103884101  0.0004052931 0.034624076 0.005205948  0.000949613
##           PC4 18      PC5 18       PC6 18       PC7 18        PC8 18
## 2734  0.003190829 0.008667941 0.002687195 -0.026911289 -0.0001620121
## 2735  0.006584224 0.016100115 0.006890623 -0.007742636 -0.0036631549
## 2736 -0.002698839 0.004498478 0.005441182 -0.010549693  0.0067195544
##           PC9 18      PC10 18       PC11 18       PC12 18        PC13 18
## 2734 0.006106826 -0.011363564 -0.018000211  0.0009775351 -0.0045258930
## 2735 0.011260290 -0.005558009 -0.007537158  0.0076142048  0.0005826421
## 2736 0.015640845 -0.003901117 -0.008280900 -0.0053730728 -0.0025605278
##           PC14 18      PC15 18      PC16 18       PC17 18       PC18 18
## 2734 0.003048895  0.001846851  0.001551133 -0.0079583987 -0.007826703
## 2735 0.012737709  0.003020688 -0.004870965 -0.0046892506 -0.002352153
## 2736 0.007616328 -0.006317709 -0.010458091 -0.0007994696 -0.007689906
##           PC19 18      PC20 18       PC21 18      PC22 18       PC23 18
## 2734  0.009202174  0.005763859 -0.008086903 -0.004754573 -0.013657625
## 2735 -0.002229670 -0.004523743  0.003882070 -0.006558041 -0.009786551
## 2736  0.003091850  0.011886646  0.012040182 -0.005505205  0.003720736
##           PC24 18      PC25 18       PC26 18       PC27 18       PC28 18
## 2734 -0.003073428  0.010806554 -1.830437e-05 -0.004432088 -0.0156208007
## 2735 -0.002531478 -0.002298018 -5.241521e-04  0.010388410  0.0004052931
## 2736 -0.004686385 -0.005441511  1.381495e-02  0.003482180  0.0015275743
##           PC1 19      PC2 19       PC3 19       PC4 19      PC5 19
## 2734 0.005834737  0.001139935 -0.007179797  0.006584224 0.016100115
## 2735 0.034624076  0.005205948  0.000949613 -0.002698839 0.004498478
## 2736 0.001936848 -0.016993794  0.008234414  0.005230627 0.009102643
##           PC6 19       PC7 19       PC8 19      PC9 19      PC10 19
## 2734 0.006890623 -0.0077426358 -0.003663155 0.011260290 -0.005558009
## 2735 0.005441182 -0.0105496935  0.006719554 0.015640845 -0.003901117
```

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## 2736  0.018128642   0.0008742094   0.005394702 0.002797239 -0.011185699
##               PC11 19       PC12 19        PC13 19      PC14 19      PC15 19
## 2734 -0.007537158   0.007614205   0.0005826421 0.012737709  0.003020688
## 2735 -0.008280900  -0.005373073  -0.0025605278 0.007616328 -0.006317709
## 2736 -0.002337999   0.010018188  -0.0008056187 0.001491583  0.003542575
##               PC16 19       PC17 19        PC18 19      PC19 19      PC20 19
## 2734 -0.004870965  -0.0046892506 -0.002352153 -0.00222967  -0.004523743
## 2735 -0.010458091  -0.0007994696 -0.007689906  0.00309185   0.011886646
## 2736 -0.007815107   0.0082907477  0.001827857 -0.02068809  -0.008824442
##               PC21 19       PC22 19        PC23 19       PC24 19       PC25 19
## 2734  0.0038820698 -0.006558041  -0.009786551 -0.002531478 -0.002298018
## 2735  0.0120401821 -0.005505205   0.003720736 -0.004686385 -0.005441511
## 2736 -0.0001010168 -0.005169975   0.001741985 -0.004128358  0.007691511
##               PC26 19       PC27 19       PC28 19       PC1 20       PC2 20
## 2734 -0.0005241521   0.01038841 0.0004052931 0.034624076   0.005205948
## 2735  0.0138149487   0.00348218 0.0015275743 0.001936848  -0.016993794
## 2736 -0.0045661480  -0.01222391 0.0050321602 0.011074976  -0.004667022
##               PC3 20       PC4 20       PC5 20       PC6 20       PC7 20
## 2734  0.000949613 -0.002698839 0.004498478   0.005441182 -0.0105496935
## 2735  0.008234414  0.005230627 0.009102643   0.018128642  0.0008742094
## 2736 -0.013352504 -0.013834773 0.001296568  -0.001104673  0.0108037971
##               PC8 20       PC9 20       PC10 20       PC11 20      PC12 20
## 2734  0.006719554   0.015640845 -0.003901117 -0.008280900 -0.005373073
## 2735  0.005394702   0.002797239 -0.011185699 -0.002337999  0.010018188
## 2736 -0.010376347  -0.012938514  0.032784610 -0.003402802  0.003688597
##               PC13 20       PC14 20       PC15 20       PC16 20       PC17 20
## 2734 -0.0025605278   0.007616328 -0.006317709 -0.010458091 -0.0007994696
## 2735 -0.0008056187   0.001491583  0.003542575 -0.007815107  0.0082907477
## 2736  0.0097334542  -0.015578912 -0.008225980 -0.006672685  0.0142198410
##               PC18 20       PC19 20       PC20 20       PC21 20       PC22 20
## 2734 -0.007689906   0.003091850  0.011886646  0.0120401821 -0.005505205
## 2735  0.001827857  -0.020688089 -0.008824442 -0.0001010168 -0.005169975
## 2736  0.003127474  -0.006444038  0.003638316  0.0072387247  0.007597271
##               PC23 20       PC24 20       PC25 20       PC26 20       PC27 20
## 2734  0.0037207359 -0.0046863854 -0.005441511  0.013814949  0.00348218
## 2735  0.0017419849 -0.0041283576  0.007691511 -0.004566148 -0.01222391
## 2736 -0.0003737374  0.0006935498 -0.005345997  0.007475343 -0.01608591
##               PC28 20       PC1 21       PC2 21       PC3 21       PC4 21
## 2734  0.001527574   0.001936848 -0.016993794  0.008234414  0.005230627
## 2735  0.005032160   0.011074976 -0.004667022 -0.013352504 -0.013834773
## 2736 -0.013453110  -0.029513567 -0.012202541 -0.010570150  0.004581795
##               PC5 21       PC6 21       PC7 21       PC8 21       PC9 21
## 2734  0.009102643   0.018128642  0.0008742094  0.005394702  0.002797239
## 2735  0.001296568  -0.001104673  0.0108037971 -0.010376347 -0.012938514
## 2736 -0.015482236  -0.004104887 -0.0026507436 -0.008421182 -0.009923597
##               PC10 21       PC11 21       PC12 21       PC13 21       PC14 21
## 2734 -0.01118570  -0.002337999   0.010018188 -0.0008056187  0.001491583
## 2735  0.03278461  -0.003402802   0.003688597  0.0097334542 -0.015578912
## 2736 -0.00674432  -0.001665003  -0.001345716 -0.0033571614 -0.001635707
##               PC15 21       PC16 21       PC17 21       PC18 21       PC19 21
## 2734  0.003542575  -0.007815107 0.008290748  0.001827857 -0.020688089
## 2735 -0.008225980  -0.006672685 0.014219841  0.003127474 -0.006444038
## 2736  0.006738413   0.005353452 0.005257392 -0.002178994 -0.015836254
##               PC20 21       PC21 21       PC22 21       PC23 21       PC24 21
```

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## 2734 -0.008824442 -0.0001010168 -0.005169975  0.0017419849 -0.0041283576
## 2735  0.003638316  0.0072387247  0.007597271 -0.0003737374  0.0006935498
## 2736 -0.009977476  0.0138299183  0.001493822  0.0005555942  0.0047415194
##            PC25 21      PC26 21      PC27 21     PC28 21      PC1 22
## 2734  0.007691511 -0.004566148 -0.01222391  0.00503216  0.01107498
## 2735 -0.005345997  0.007475343 -0.01608591 -0.01345311 -0.02951357
## 2736  0.002929046  0.005879346 -0.02435581 -0.01372051  0.02333543
##             PC2 22       PC3 22       PC4 22       PC5 22       PC6 22
## 2734 -0.004667022 -0.013352504 -0.013834773  0.001296568 -0.001104673
## 2735 -0.012202541 -0.010570150  0.004581795 -0.015482236 -0.004104887
## 2736 -0.006828235  0.006288629 -0.016897385 -0.005790068 -0.015265225
##             PC7 22       PC8 22       PC9 22      PC10 22      PC11 22
## 2734  0.010803797 -0.010376347 -0.012938514  0.03278461 -0.003402802
## 2735 -0.002650744 -0.008421182 -0.009923597 -0.00674432 -0.001665003
## 2736  0.001638194 -0.008839639 -0.015884951  0.01096400 -0.005002469
##            PC12 22      PC13 22      PC14 22      PC15 22      PC16 22
## 2734  0.003688597  0.009733454 -0.015578912 -0.008225980 -0.006672685
## 2735 -0.001345716 -0.003357161 -0.001635707  0.006738413  0.005353452
## 2736  0.011998725  0.010989865  0.014117526  0.007749804 -0.027892803
##            PC17 22      PC18 22      PC19 22      PC20 22      PC21 22
## 2734  0.014219841  0.003127474 -0.006444038  0.003638316  0.007238725
## 2735  0.005257392 -0.002178994 -0.015836254 -0.009977476  0.013829918
## 2736 -0.003745833 -0.002602667  0.011511465  0.004448992 -0.001235334
##            PC22 22      PC23 22       PC24 22      PC25 22     PC26 22
## 2734  0.007597271 -0.0003737374  0.0006935498 -0.005345997 0.007475343
## 2735  0.001493822  0.0005555942  0.0047415194  0.002929046 0.005879346
## 2736 -0.028370796  0.0174421391 -0.0082995817  0.021160025 0.015319448
##            PC27 22     PC28 22       PC1 23       PC2 23       PC3 23
## 2734 -0.016085909 -0.01345311 -0.029513567 -0.012202541 -0.010570150
## 2735 -0.024355809 -0.01372051  0.023335430 -0.006828235  0.006288629
## 2736  0.003821087  0.01016556  0.006413589 -0.002021868  0.006805408
##             PC4 23       PC5 23       PC6 23       PC7 23        PC8 23
## 2734  0.004581795 -0.015482236 -0.004104887 -0.002650744 -8.421182e-03
## 2735 -0.016897385 -0.005790068 -0.015265225  0.001638194 -8.839639e-03
## 2736 -0.001225388  0.001177826 -0.007300940 -0.006602809 -1.783308e-05
##             PC9 23      PC10 23      PC11 23      PC12 23      PC13 23
## 2734 -0.009923597 -0.006744320 -0.001665003 -0.001345716 -0.003357161
## 2735 -0.015884951  0.010964000 -0.005002469  0.011998725  0.010989865
## 2736 -0.002163678  0.001720475  0.006579716  0.002329779 -0.004470814
##            PC14 23      PC15 23      PC16 23      PC17 23      PC18 23
## 2734 -0.001635707  0.006738413  0.005353452  0.005257392 -0.002178994
## 2735  0.014117526  0.007749804 -0.027892803 -0.003745833 -0.002602667
## 2736  0.001443804 -0.004317702  0.011433480 -0.011536780  0.014073986
##            PC19 23      PC20 23      PC21 23      PC22 23       PC23 23
## 2734 -0.015836254 -0.009977476  0.013829918  0.001493822  0.0005555942
## 2735  0.011511465  0.004448992 -0.001235334 -0.028370796  0.0174421391
## 2736  0.003568132  0.001128407 -0.007242326  0.005155869 -0.0034664324
##            PC24 23      PC25 23     PC26 23      PC27 23     PC28 23
## 2734  0.0047415194  0.0029290458 0.005879346 -0.024355809 -0.01372051
## 2735 -0.0082995817  0.0211600251 0.015319448  0.003821087  0.01016556
## 2736  0.0007484938 -0.0001336814 0.003258483  0.009059433  0.02876421
##             PC1 24       PC2 24      PC3 24       PC4 24       PC5 24
## 2734  0.023335430 -0.006828235 0.006288629 -0.016897385 -0.005790068
## 2735  0.006413589 -0.002021868 0.006805408 -0.001225388  0.001177826
```

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## 2736 -0.007360876 -0.010721546 0.014415329 -0.008500839  0.012891618
##           PC6 24      PC7 24      PC8 24      PC9 24       PC10 24
## 2734 -0.015265225  0.001638194 -8.839639e-03 -0.015884951  0.0109639998
## 2735 -0.007300940 -0.006602809 -1.783308e-05 -0.002163678  0.0017204750
## 2736 -0.006380902 -0.012157642  2.071949e-02 -0.010013274 -0.0002577849
##          PC11 24     PC12 24     PC13 24      PC14 24      PC15 24
## 2734 -0.005002469 0.011998725  0.0109898652  0.0141175265  0.0077498043
## 2735  0.006579716 0.002329779 -0.0044708135  0.0014438041 -0.0043177020
## 2736 -0.004733457 0.007162959 -0.0001743807 -0.0009131516 -0.0005988394
##          PC16 24     PC17 24      PC18 24     PC19 24     PC20 24
## 2734 -0.027892803 -0.003745833 -0.002602667  0.011511465  0.004448992
## 2735  0.011433480 -0.011536780  0.014073986  0.003568132  0.001128407
## 2736 -0.007390431  0.006714083 -0.004398968 -0.006297874 -0.002350324
##          PC21 24     PC22 24      PC23 24      PC24 24      PC25 24
## 2734 -0.001235334 -0.028370796  0.017442139 -0.0082995817  0.0211600251
## 2735 -0.007242326  0.005155869 -0.003466432  0.0007484938 -0.0001336814
## 2736  0.009126124 -0.013240297 -0.006836632 -0.0104501846  0.0194435045
##          PC26 24    PC27 24    PC28 24     PC1 25      PC2 25
## 2734 0.015319448 0.003821087 0.01016556  0.006413589 -0.002021868
## 2735 0.003258483 0.009059433 0.02876421 -0.007360876 -0.010721546
## 2736 0.009330921 0.018603299 0.01011519  0.031757273  0.007415534
##           PC3 25      PC4 25      PC5 25      PC6 25      PC7 25
## 2734 0.006805408 -0.001225388 0.001177826 -0.007300940 -0.006602809
## 2735 0.014415329 -0.008500839 0.012891618 -0.006380902 -0.012157642
## 2736 0.017095801 -0.005152023 0.003854628  0.005098914 -0.002313464
##            PC8 25      PC9 25      PC10 25     PC11 25     PC12 25
## 2734 -1.783308e-05 -0.002163678  0.0017204750  0.006579716  0.002329779
## 2735  2.071949e-02 -0.010013274 -0.0002577849 -0.004733457  0.007162959
## 2736 -1.444696e-03  0.014377924 -0.0151540689  0.004363809 -0.003738134
##           PC13 25      PC14 25      PC15 25      PC16 25     PC17 25
## 2734 -0.0044708135  0.0014438041 -0.0043177020  0.011433480 -0.011536780
## 2735 -0.0001743807 -0.0009131516 -0.0005988394 -0.007390431  0.006714083
## 2736  0.0018261444  0.0097547286 -0.0094129746 -0.004278786  0.000490045
##          PC18 25     PC19 25     PC20 25      PC21 25     PC22 25
## 2734  0.014073986  0.003568132  0.001128407 -0.007242326  0.005155869
## 2735 -0.004398968 -0.006297874 -0.002350324  0.009126124 -0.013240297
## 2736  0.008370000  0.008955257 -0.007816324  0.002558092  0.014727753
##          PC23 25      PC24 25      PC25 25     PC26 25    PC27 25
## 2734 -0.003466432  0.0007484938 -0.0001336814  0.003258483 0.009059433
## 2735 -0.006836632 -0.0104501846  0.0194435045  0.009330921 0.018603299
## 2736 -0.002174717 -0.0087681709 -0.0011317300 -0.006293295 0.004870265
##          PC28 25     PC1 26      PC2 26       PC3 26      PC4 26
## 2734  0.02876421 -0.007360876 -0.0107215460 0.01441533 -0.0085008390
## 2735  0.01011519  0.031757273  0.0074155344 0.01709580 -0.0051520226
## 2736 -0.01056219  0.016065895  0.0001959981 0.01042725 -0.0005044919
##           PC5 26      PC6 26      PC7 26      PC8 26      PC9 26
## 2734 0.012891618 -0.006380902 -0.012157642  0.020719488 -0.01001327
## 2735 0.003854628  0.005098914 -0.002313464 -0.001444696  0.01437792
## 2736 0.009033974  0.003273471  0.006035345  0.002667356  0.01102793
##           PC10 26     PC11 26     PC12 26      PC13 26      PC14 26
## 2734 -0.0002577849 -0.004733457  0.007162959 -0.0001743807 -0.0009131516
## 2735 -0.0151540689  0.004363809 -0.003738134  0.0018261444  0.0097547286
## 2736 -0.0062383170  0.006099204  0.006896763  0.0008353801  0.0082251925
##           PC15 26     PC16 26     PC17 26      PC18 26     PC19 26
```

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## 2734 -0.0005988394 -0.007390431  0.006714083 -0.004398968 -0.006297874
## 2735 -0.0094129746 -0.004278786  0.000490045  0.008370000  0.008955257
## 2736 -0.0092708617 -0.008943779 -0.002922513  0.009064571 -0.009557119
##             PC20 26      PC21 26      PC22 26      PC23 26      PC24 26
## 2734 -0.0023503236 0.009126124 -0.013240297 -0.006836632 -0.010450185
## 2735 -0.0078163239 0.002558092  0.014727753 -0.002174717 -0.008768171
## 2736  0.0009462904 0.003545800 -0.005252786  0.001982084 -0.017426218
##           PC25 26      PC26 26      PC27 26      PC28 26      PC1 27
## 2734  0.01944350  0.009330921 0.018603299   0.01011519 0.031757273
## 2735 -0.00113173 -0.006293295 0.004870265  -0.01056219 0.016065895
## 2736  0.01513089  0.008306286 0.015111429  -0.01194951 0.001542649
##            PC2 27      PC3 27       PC4 27      PC5 27       PC6 27
## 2734  0.0074155344  0.01709580 -0.0051520226 0.0038546284 0.005098914
## 2735  0.0001959981  0.01042725 -0.0005044919 0.0090339741 0.003273471
## 2736 -0.0042213206 -0.00194789 -0.0042937689 0.0002123457 -0.001579354
##            PC7 27       PC8 27      PC9 27       PC10 27      PC11 27
## 2734 -0.002313464 -0.001444696  0.01437792 -0.015154069 0.004363809
## 2735  0.006035345  0.002667356  0.01102793 -0.006238317 0.006099204
## 2736  0.002371364 -0.001329211 -0.01017029  0.004815487 0.001294515
##            PC12 27      PC13 27      PC14 27      PC15 27      PC16 27
## 2734 -0.003738134 0.0018261444 0.0097547286 -0.009412975 -0.004278786
## 2735  0.006896763 0.0008353801 0.0082251925 -0.009270862 -0.008943779
## 2736 -0.004117633 0.0033614300 0.0002272163 -0.002007149  0.001541251
##            PC17 27      PC18 27      PC19 27      PC20 27      PC21 27
## 2734  0.000490045 0.008370000  0.008955257 -0.0078163239 0.002558092
## 2735 -0.002922513 0.009064571 -0.009557119  0.0009462904 0.003545800
## 2736 -0.010638902 0.004806431  0.006921345 -0.0012519456 0.004175898
##            PC22 27      PC23 27      PC24 27      PC25 27      PC26 27
## 2734  0.014727753 -0.002174717 -0.008768171 -0.001131730 -0.006293295
## 2735 -0.005252786  0.001982084 -0.017426218  0.015130891  0.008306286
## 2736 -0.004225146  0.005584844 -0.004997601  0.002360958 -0.006798160
##            PC27 27      PC28 27      PC1 28       PC2 28       PC3 28
## 2734  0.004870265 -0.010562192 0.016065895  0.0001959981  0.010427253
## 2735  0.015111429 -0.011949506 0.001542649 -0.0042213206 -0.001947890
## 2736 -0.002196084 -0.007277048 0.002840059  0.0116729576  0.004271789
##            PC4 28       PC5 28       PC6 28       PC7 28       PC8 28
## 2734 -0.0005044919 0.0090339741  0.003273471  0.006035345  0.0026673557
## 2735 -0.0042937689 0.0002123457 -0.001579354  0.002371364 -0.0013292108
## 2736  0.0109830816 0.0102714589  0.014330252 -0.005751958  0.0001798644
##            PC9 28      PC10 28      PC11 28      PC12 28      PC13 28
## 2734  0.01102793 -0.006238317  0.006099204  0.006896763  0.0008353801
## 2735 -0.01017029  0.004815487  0.001294515 -0.004117633  0.0033614300
## 2736  0.01246844 -0.003199140 -0.004955072 -0.007428330 -0.0033565039
##            PC14 28      PC15 28      PC16 28      PC17 28      PC18 28
## 2734  0.0082251925 -0.009270862 -0.008943779 -0.002922513  0.009064571
## 2735  0.0002272163 -0.002007149  0.001541251 -0.010638902  0.004806431
## 2736 -0.0018331390  0.007716868  0.005586264  0.001700438 -0.006691526
##            PC19 28      PC20 28      PC21 28      PC22 28      PC23 28
## 2734 -0.009557119  0.0009462904  0.003545800 -0.005252786  0.001982084
## 2735  0.006921345 -0.0012519456  0.004175898 -0.004225146  0.005584844
## 2736  0.002305172  0.0052902052 -0.004111357 -0.001329509 -0.002704270
##            PC24 28      PC25 28      PC26 28      PC27 28      PC28 28
## 2734 -0.017426218  0.0151308906  0.008306286  0.015111429 -0.011949506
## 2735 -0.004997601  0.0023609576 -0.006798160 -0.002196084 -0.007277048
```

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## 2736 -0.003637770 -0.0007201003  0.005745236  0.007533170  0.006628082
##             PC1 29        PC2 29        PC3 29        PC4 29        PC5 29
## 2734 0.001542649 -0.0042213206 -0.001947890 -0.004293769  0.0002123457
## 2735 0.002840059  0.0116729576  0.004271789  0.010983082  0.0102714589
## 2736 0.004152912 -0.0004026847 -0.003061326 -0.005218536 -0.0036890650
##             PC6 29        PC7 29        PC8 29        PC9 29       PC10 29
## 2734 -0.001579354  0.002371364 -0.0013292108 -0.010170289  0.0048154873
## 2735  0.014330252 -0.005751958  0.0001798644  0.012468440 -0.0031991401
## 2736 -0.003561239 -0.000952893 -0.0012125478 -0.003107476 -0.0008490745
##            PC11 29       PC12 29       PC13 29       PC14 29       PC15 29
## 2734  0.001294515 -0.004117633  0.0033614300  2.272163e-04 -0.002007149
## 2735 -0.004955072 -0.007428330 -0.0033565039 -1.833139e-03  0.007716868
## 2736  0.001397529 -0.001088439  0.0004615318 -5.521067e-05  0.005198921
##            PC16 29       PC17 29       PC18 29      PC19 29       PC20 29
## 2734  0.001541251 -0.010638902  0.0048064314 0.006921345 -0.001251946
## 2735  0.005586264  0.001700438 -0.0066915257 0.002305172  0.005290205
## 2736 -0.002059144 -0.005337893 -0.0001781318 0.009359325  0.002511209
##            PC21 29       PC22 29       PC23 29       PC24 29       PC25 29
## 2734  0.004175898 -0.004225146  0.005584844 -0.004997601  0.0023609576
## 2735 -0.004111357 -0.001329509 -0.002704270 -0.003637770 -0.0007201003
## 2736  0.002310348  0.001460427  0.005463946 -0.001136815 -0.0014727683
##            PC26 29       PC27 29       PC28 29       PC1 30        PC2 30
## 2734 -0.006798160 -0.002196084 -0.007277048 0.002840059  0.0116729576
## 2735  0.005745236  0.007533170  0.006628082 0.004152912 -0.0004026847
## 2736  0.004644647  0.006314596  0.003762919 0.001304425  0.0018875775
##             PC3 30        PC4 30        PC5 30        PC6 30        PC7 30
## 2734  0.004271789  0.010983082  0.0102714589  0.014330252 -0.005751958
## 2735 -0.003061326 -0.005218536 -0.0036890650 -0.003561239 -0.000952893
## 2736 -0.003867042  0.001279185 -0.0006594781 -0.004373809  0.005977279
##             PC8 30        PC9 30       PC10 30       PC11 30       PC12 30
## 2734  0.0001798644  0.012468440 -0.0031991401 -0.004955072 -0.007428330
## 2735 -0.0012125478 -0.003107476 -0.0008490745  0.001397529 -0.001088439
## 2736  0.0026032475 -0.003955834  0.0016889073  0.004696278  0.001798683
##            PC13 30       PC14 30      PC15 30       PC16 30       PC17 30
## 2734 -0.0033565039 -1.833139e-03 0.007716868  0.005586264  0.001700438
## 2735  0.0004615318 -5.521067e-05 0.005198921 -0.002059144 -0.005337893
## 2736  0.0015093741 -5.009754e-03 0.002620978  0.005406577  0.004301277
##            PC18 30       PC19 30      PC20 30       PC21 30       PC22 30
## 2734 -0.0066915257  0.002305172 5.290205e-03 -0.004111357 -0.001329509
## 2735 -0.0001781318  0.009359325 2.511209e-03  0.002310348  0.001460427
## 2736  0.0023708449 -0.003054535 4.499344e-05 -0.001730911  0.010740445
##            PC23 30       PC24 30      PC25 30       PC26 30       PC27 30
## 2734 -0.002704270 -0.003637770 -0.0007201003  0.005745236 0.007533170
## 2735  0.005463946 -0.001136815 -0.0014727683  0.004644647 0.006314596
## 2736  0.004083232  0.002469112 -0.0077797630 -0.002998893 0.001209593
##            PC28 30        PC1 31        PC2 31        PC3 31        PC4 31
## 2734 0.006628082  0.004152912 -0.0004026847 -0.003061326 -0.005218536
## 2735 0.003762919  0.001304425  0.0018875775 -0.003867042  0.001279185
## 2736 0.001172041 -0.010147294  0.0034429189  0.001368047  0.001016256
##             PC5 31        PC6 31        PC7 31        PC8 31        PC9 31
## 2734 -0.0036890650 -0.003561239 -0.000952893 -0.001212548 -0.003107476
## 2735 -0.0006594781 -0.004373809  0.005977279  0.002603247 -0.003955834
## 2736  0.0020781035 -0.002458121 -0.001853949 -0.002039229 -0.006944569
##            PC10 31       PC11 31       PC12 31       PC13 31       PC14 31
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32

```
## 2734 -0.0008490745 0.001397529 -0.001088439 0.0004615318 -5.521067e-05
## 2735  0.0016889073 0.004696278  0.001798683 0.0015093741 -5.009754e-03
## 2736 -0.0007872111 0.002232208 -0.001351749 0.0007243608 -7.690114e-04
##            PC15 31       PC16 31       PC17 31        PC18 31       PC19 31
## 2734 0.0051989206 -0.002059144 -0.005337893 -0.0001781318  0.009359325
## 2735 0.0026209778  0.005406577  0.004301277  0.0023708449 -0.003054535
## 2736 0.0007290852  0.000822096 -0.002500390  0.0064683027 -0.001265961
##            PC20 31       PC21 31      PC22 31      PC23 31        PC24 31
## 2734  2.511209e-03  0.002310348  0.001460427 0.005463946 -0.0011368147
## 2735  4.499344e-05 -0.001730911  0.010740445 0.004083232  0.0024691117
## 2736 -4.162914e-03 -0.001266799 -0.007467462 0.001006332 -0.0004220259
##            PC25 31       PC26 31      PC27 31     PC28 31
## 2734 -0.001472768  0.004644647 0.006314596 0.003762919 0 0 0 0 0 0 0 0 0 0
## 2735 -0.007779763 -0.002998893 0.001209593 0.001172041 0 0 0 0 0 0 0 0 0 0
## 2736 -0.000328665 -0.002067592 0.004693899 0.002395083 0 0 0 0 0 0 0 0 0 0
##
## 2734 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
## 2735 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
## 2736 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
```

```r
summary(pca_pred_all[,1:60])
```

```
##        V1                  PC1 1              PC2 1
##  Min.   :-0.3902440   Min.   :-0.478295   Min.   :-7.654e-02
##  1st Qu.:-0.0085695   1st Qu.:-0.027999   1st Qu.:-9.417e-03
##  Median : 0.0004295   Median : 0.004085   Median :-9.763e-05
##  Mean   : 0.0003925   Mean   : 0.001794   Mean   :-3.218e-04
##  3rd Qu.: 0.0093420   3rd Qu.: 0.037122   3rd Qu.: 7.977e-03
##  Max.   : 0.5782490   Max.   : 0.590518   Max.   : 1.289e-01
##      PC3 1               PC4 1               PC5 1
##  Min.   :-1.079e-01   Min.   :-0.1261147   Min.   :-9.155e-02
##  1st Qu.:-1.155e-02   1st Qu.:-0.0103041   1st Qu.:-1.003e-02
##  Median : 7.872e-05   Median :-0.0012274   Median : 5.854e-04
##  Mean   :-3.826e-04   Mean   :-0.0003468   Mean   : 3.946e-05
##  3rd Qu.: 1.180e-02   3rd Qu.: 0.0090757   3rd Qu.: 9.278e-03
##  Max.   : 1.048e-01   Max.   : 0.1205504   Max.   : 1.378e-01
##      PC6 1               PC7 1               PC8 1
##  Min.   :-0.1323649   Min.   :-0.0918890   Min.   :-0.0956180
##  1st Qu.:-0.0086663   1st Qu.:-0.0071992   1st Qu.:-0.0077826
##  Median :-0.0014858   Median : 0.0004057   Median : 0.0003298
##  Mean   :-0.0007991   Mean   : 0.0003168   Mean   : 0.0002099
##  3rd Qu.: 0.0067916   3rd Qu.: 0.0078802   3rd Qu.: 0.0088551
##  Max.   : 0.1471292   Max.   : 0.0806441   Max.   : 0.0632803
##      PC9 1               PC10 1              PC11 1
##  Min.   :-0.1269958   Min.   :-9.435e-02   Min.   :-0.0701813
##  1st Qu.:-0.0108615   1st Qu.:-7.721e-03   1st Qu.:-0.0065679
##  Median :-0.0013413   Median : 3.827e-04   Median : 0.0002329
##  Mean   :-0.0001867   Mean   : 8.097e-05   Mean   : 0.0002338
##  3rd Qu.: 0.0085053   3rd Qu.: 8.136e-03   3rd Qu.: 0.0070403
##  Max.   : 0.2003549   Max.   : 7.909e-02   Max.   : 0.0579369
##      PC12 1              PC13 1              PC14 1
##  Min.   :-8.737e-02   Min.   :-7.910e-02   Min.   :-6.684e-02
##  1st Qu.:-7.270e-03   1st Qu.:-4.307e-03   1st Qu.:-6.948e-03
##  Median : 4.170e-04   Median : 1.024e-04   Median : 1.871e-04
```

```
## Mean   : 4.589e-05   Mean   : 7.572e-05   Mean   : 2.785e-05
## 3rd Qu.: 6.661e-03   3rd Qu.: 4.775e-03   3rd Qu.: 7.112e-03
## Max.   : 1.223e-01   Max.   : 6.001e-02   Max.   : 7.125e-02
##     PC15 1               PC16 1               PC17 1
## Min.   :-0.0738148   Min.   :-0.0551806   Min.   :-0.0887177
## 1st Qu.:-0.0065250   1st Qu.:-0.0069062   1st Qu.:-0.0072246
## Median : 0.0002699   Median :-0.0005380   Median : 0.0004644
## Mean   : 0.0003134   Mean   :-0.0001739   Mean   : 0.0004406
## 3rd Qu.: 0.0070455   3rd Qu.: 0.0062654   3rd Qu.: 0.0084982
## Max.   : 0.0627499   Max.   : 0.0987362   Max.   : 0.0839709
##     PC18 1               PC19 1               PC20 1
## Min.   :-0.0713754   Min.   :-0.0470101   Min.   :-0.0736379
## 1st Qu.:-0.0071831   1st Qu.:-0.0065160   1st Qu.:-0.0075435
## Median :-0.0001740   Median :-0.0003029   Median :-0.0003657
## Mean   :-0.0001001   Mean   :-0.0001941   Mean   :-0.0003280
## 3rd Qu.: 0.0063633   3rd Qu.: 0.0059641   3rd Qu.: 0.0074378
## Max.   : 0.0820123   Max.   : 0.0481702   Max.   : 0.1205659
##     PC21 1               PC22 1               PC23 1
## Min.   :-6.712e-02   Min.   :-0.1138672   Min.   :-0.0815318
## 1st Qu.:-6.549e-03   1st Qu.:-0.0081509   1st Qu.:-0.0077861
## Median : 6.651e-05   Median : 0.0006167   Median : 0.0005805
## Mean   :-1.639e-05   Mean   : 0.0005039   Mean   :-0.0002252
## 3rd Qu.: 6.979e-03   3rd Qu.: 0.0091152   3rd Qu.: 0.0074079
## Max.   : 5.443e-02   Max.   : 0.1007920   Max.   : 0.0709705
##     PC24 1               PC25 1               PC26 1
## Min.   :-5.620e-02   Min.   :-0.0960103   Min.   :-0.1182532
## 1st Qu.:-6.407e-03   1st Qu.:-0.0075512   1st Qu.:-0.0074409
## Median : 9.344e-05   Median :-0.0002211   Median :-0.0006104
## Mean   : 1.131e-04   Mean   : 0.0001152   Mean   :-0.0004003
## 3rd Qu.: 6.993e-03   3rd Qu.: 0.0073217   3rd Qu.: 0.0066336
## Max.   : 7.588e-02   Max.   : 0.1005322   Max.   : 0.1121625
##     PC27 1               PC28 1               PC1 2
## Min.   :-1.272e-01   Min.   :-0.2968589   Min.   :-0.478295
## 1st Qu.:-7.911e-03   1st Qu.:-0.0080573   1st Qu.:-0.027999
## Median : 3.860e-06   Median :-0.0009100   Median : 0.004054
## Mean   : 1.126e-04   Mean   :-0.0009105   Mean   : 0.001730
## 3rd Qu.: 7.955e-03   3rd Qu.: 0.0060031   3rd Qu.: 0.036915
## Max.   : 1.057e-01   Max.   : 0.3198662   Max.   : 0.590518
##     PC2 2                PC3 2                PC4 2
## Min.   :-7.654e-02   Min.   :-0.1079025   Min.   :-0.1261147
## 1st Qu.:-9.446e-03   1st Qu.:-0.0114590   1st Qu.:-0.0103041
## Median :-9.763e-05   Median : 0.0001149   Median :-0.0012274
## Mean   :-3.295e-04   Mean   :-0.0003550   Mean   :-0.0003477
## 3rd Qu.: 7.977e-03   3rd Qu.: 0.0117996   3rd Qu.: 0.0090757
## Max.   : 1.289e-01   Max.   : 0.1048281   Max.   : 0.1205504
##     PC5 2                PC6 2                PC7 2
## Min.   :-9.155e-02   Min.   :-0.1323649   Min.   :-0.0918890
## 1st Qu.:-1.003e-02   1st Qu.:-0.0086663   1st Qu.:-0.0071992
## Median : 5.592e-04   Median :-0.0015113   Median : 0.0004163
## Mean   : 3.108e-05   Mean   :-0.0008185   Mean   : 0.0003232
## 3rd Qu.: 9.278e-03   3rd Qu.: 0.0067529   3rd Qu.: 0.0078802
## Max.   : 1.378e-01   Max.   : 0.1471292   Max.   : 0.0806441
##     PC8 2                PC9 2                PC10 2
## Min.   :-0.0956180   Min.   :-0.1269958   Min.   :-9.435e-02
```

34

```
##   1st Qu.:-0.0077826   1st Qu.:-0.0108615   1st Qu.:-7.695e-03
##   Median : 0.0003444   Median :-0.0013039   Median : 3.827e-04
##   Mean   : 0.0002184   Mean   :-0.0001757   Mean   : 8.372e-05
##   3rd Qu.: 0.0088551   3rd Qu.: 0.0085053   3rd Qu.: 8.136e-03
##   Max.   : 0.0632803   Max.   : 0.2003549   Max.   : 7.909e-02
##      PC11 2               PC12 2               PC13 2
##   Min.   :-0.0701813   Min.   :-8.737e-02   Min.   :-7.910e-02
##   1st Qu.:-0.0065679   1st Qu.:-7.270e-03   1st Qu.:-4.298e-03
##   Median : 0.0002329   Median : 4.170e-04   Median : 1.024e-04
##   Mean   : 0.0002397   Mean   : 3.986e-05   Mean   : 8.535e-05
##   3rd Qu.: 0.0070574   3rd Qu.: 6.614e-03   3rd Qu.: 4.775e-03
##   Max.   : 0.0579369   Max.   : 1.223e-01   Max.   : 6.001e-02
##      PC14 2               PC15 2               PC16 2
##   Min.   :-6.684e-02   Min.   :-0.0738148   Min.   :-0.0551806
##   1st Qu.:-6.948e-03   1st Qu.:-0.0065166   1st Qu.:-0.0069361
##   Median : 1.871e-04   Median : 0.0002699   Median :-0.0006153
##   Mean   : 3.172e-05   Mean   : 0.0003200   Mean   :-0.0001873
##   3rd Qu.: 7.112e-03   3rd Qu.: 0.0070455   3rd Qu.: 0.0062654
##   Max.   : 7.125e-02   Max.   : 0.0627499   Max.   : 0.0987362
##      PC17 2               PC18 2               PC19 2
##   Min.   :-0.0887177   Min.   :-7.138e-02   Min.   :-0.0470101
##   1st Qu.:-0.0072057   1st Qu.:-7.175e-03   1st Qu.:-0.0065160
##   Median : 0.0004879   Median :-1.740e-04   Median :-0.0003029
##   Mean   : 0.0004709   Mean   :-8.815e-05   Mean   :-0.0002006
##   3rd Qu.: 0.0085433   3rd Qu.: 6.363e-03   3rd Qu.: 0.0059641
##   Max.   : 0.0839709   Max.   : 8.201e-02   Max.   : 0.0481702
##      PC20 2               PC21 2               PC22 2
##   Min.   :-0.0736379   Min.   :-6.712e-02   Min.   :-0.1138672
##   1st Qu.:-0.0075435   1st Qu.:-6.517e-03   1st Qu.:-0.0080786
##   Median :-0.0003973   Median : 6.651e-05   Median : 0.0006556
##   Mean   :-0.0003290   Mean   :-1.431e-05   Mean   : 0.0005154
##   3rd Qu.: 0.0074378   3rd Qu.: 6.979e-03   3rd Qu.: 0.0091152
##   Max.   : 0.1205659   Max.   : 5.443e-02   Max.   : 0.1007920
##      PC23 2               PC24 2               PC25 2
##   Min.   :-0.0815318   Min.   :-5.620e-02   Min.   :-0.0960103
##   1st Qu.:-0.0076757   1st Qu.:-6.407e-03   1st Qu.:-0.0075826
##   Median : 0.0006004   Median : 9.344e-05   Median :-0.0002327
##   Mean   :-0.0002015   Mean   : 1.139e-04   Mean   : 0.0001032
##   3rd Qu.: 0.0074629   3rd Qu.: 6.993e-03   3rd Qu.: 0.0073217
##   Max.   : 0.0709705   Max.   : 7.588e-02   Max.   : 0.1005322
##      PC26 2               PC27 2               PC28 2
##   Min.   :-0.1182532   Min.   :-1.272e-01   Min.   :-0.2968589
##   1st Qu.:-0.0074409   1st Qu.:-7.905e-03   1st Qu.:-0.0080573
##   Median :-0.0006104   Median : 2.693e-05   Median :-0.0008758
##   Mean   :-0.0004076   Mean   : 1.269e-04   Mean   :-0.0009033
##   3rd Qu.: 0.0065952   3rd Qu.: 7.955e-03   3rd Qu.: 0.0060031
##   Max.   : 0.1121625   Max.   : 1.057e-01   Max.   : 0.3198662
##      PC1 3                PC2 3                PC3 3
##   Min.   :-0.478295    Min.   :-7.654e-02   Min.   :-0.1079025
##   1st Qu.:-0.027999    1st Qu.:-9.475e-03   1st Qu.:-0.0114284
##   Median : 0.004054    Median :-9.763e-05   Median : 0.0001149
##   Mean   : 0.001795    Mean   :-3.410e-04   Mean   :-0.0003459
##   3rd Qu.: 0.037122    3rd Qu.: 7.977e-03   3rd Qu.: 0.0117996
##   Max.   : 0.590518    Max.   : 1.289e-01   Max.   : 0.1048281
```

```
# 3a)
# Lasso
# install.packages("glmnet")
library(glmnet)
```

```
## Loading required package: Matrix
```
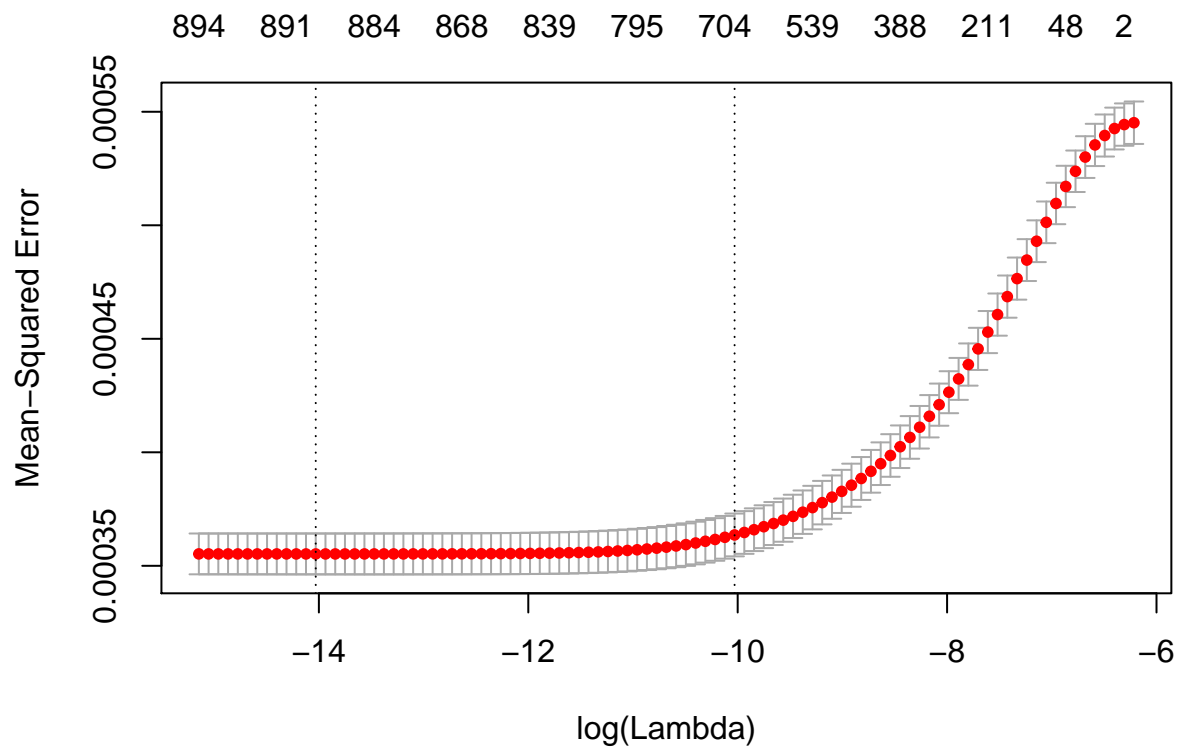
```
## Loading required package: foreach
```

```
## Loaded glmnet 2.0-5
```

```
x <- pca_pred_all[,2:897]
y <- pca_pred_all[,1]
grd <- 10 ^ seq(10,-2,length=100)
lasso.mod <- glmnet(x,y,alpha=1,lambda=grd)

# 3b)
set.seed(1)
cv.out <- cv.glmnet(x,y,alpha=1,nfolds=5)
plot(cv.out)
```



```
bestlam <- cv.out$lambda.min
```

```
out <- glmnet(x,y,nlambda=1,lambda=bestlam,alpha=1)
coef(out)
```

```
## 897 x 1 sparse Matrix of class "dgCMatrix"
##                       s0
## (Intercept)  9.108727e-04
## PC1 1        -2.489883e-03
## PC2 1         6.078520e-02
## PC3 1         9.959237e-02
## PC4 1        -5.808333e-03
## PC5 1         3.093362e-02
## PC6 1        -1.565972e-02
## PC7 1        -1.754075e-02
## PC8 1        -4.756069e-02
## PC9 1        -1.525619e-02
## PC10 1       -4.353544e-02
## PC11 1       -2.106362e-02
## PC12 1       -9.646696e-02
## PC13 1        8.004561e-02
## PC14 1        2.915542e-03
## PC15 1       -3.977138e-03
## PC16 1       -1.287260e-01
## PC17 1       -1.660193e-01
## PC18 1       -1.458406e-01
## PC19 1       -1.472592e-01
## PC20 1       -5.244356e-02
## PC21 1       -3.777099e-02
## PC22 1        1.156869e-01
## PC23 1        7.062362e-02
## PC24 1       -1.945080e-02
## PC25 1        3.464869e-02
## PC26 1       -3.863750e-02
## PC27 1        2.815360e-03
## PC28 1       -2.286269e-02
## PC1 2         9.354493e-03
## PC2 2        -1.640153e-03
## PC3 2        -4.601831e-02
## PC4 2        -9.469441e-03
## PC5 2        -1.100403e-02
## PC6 2         1.205435e-01
## PC7 2        -2.778502e-02
## PC8 2        -4.769904e-02
## PC9 2        -6.845687e-02
## PC10 2       -1.040306e-01
## PC11 2       -3.901248e-02
## PC12 2        2.837035e-02
## PC13 2       -9.525228e-02
## PC14 2       -4.741968e-02
## PC15 2       -2.202150e-02
## PC16 2        1.621831e-01
## PC17 2        3.359140e-02
## PC18 2       -1.052011e-01
## PC19 2       -5.023492e-02
## PC20 2       -1.435234e-02
## PC21 2        6.110793e-02
## PC22 2       -1.106074e-01
## PC23 2       -4.469057e-02
```

```
## PC24 2     -1.088370e-02
## PC25 2      1.238737e-01
## PC26 2     -8.866762e-02
## PC27 2      7.373266e-02
## PC28 2      7.075548e-03
## PC1 3       7.095687e-03
## PC2 3      -1.512516e-02
## PC3 3      -7.987101e-02
## PC4 3      -1.091468e-04
## PC5 3      -1.321137e-01
## PC6 3       8.060984e-02
## PC7 3      -4.343407e-02
## PC8 3      -4.261868e-02
## PC9 3       4.168632e-03
## PC10 3      8.284510e-02
## PC11 3     -3.609343e-02
## PC12 3      1.961266e-02
## PC13 3     -2.684799e-02
## PC14 3      1.132962e-02
## PC15 3     -8.824179e-02
## PC16 3      5.363903e-02
## PC17 3      1.022967e-02
## PC18 3      1.537893e-01
## PC19 3      1.408332e-01
## PC20 3      6.466562e-02
## PC21 3      2.088184e-02
## PC22 3     -2.165797e-02
## PC23 3      .
## PC24 3      5.263504e-02
## PC25 3     -1.478594e-02
## PC26 3      5.004639e-02
## PC27 3     -1.876163e-02
## PC28 3      6.152238e-03
## PC1 4      -1.143893e-02
## PC2 4      -1.223573e-03
## PC3 4       8.168295e-02
## PC4 4       4.871087e-02
## PC5 4      -3.447078e-02
## PC6 4       5.433901e-02
## PC7 4      -3.846044e-02
## PC8 4      -8.140017e-02
## PC9 4      -6.514686e-02
## PC10 4      4.626395e-02
## PC11 4      5.452676e-02
## PC12 4     -1.525443e-02
## PC13 4     -3.561358e-02
## PC14 4      9.657125e-02
## PC15 4      9.804081e-02
## PC16 4      7.261030e-02
## PC17 4     -4.785622e-02
## PC18 4      4.339817e-02
## PC19 4      2.794851e-04
## PC20 4      3.249229e-02
## PC21 4      2.970052e-02
```

```
## PC22 4      -2.571840e-03
## PC23 4      -2.536971e-02
## PC24 4      -4.658206e-02
## PC25 4      -1.645940e-02
## PC26 4       6.573801e-02
## PC27 4      -2.927073e-02
## PC28 4       5.475271e-02
## PC1 5       -5.895953e-03
## PC2 5        1.152017e-02
## PC3 5        2.499118e-02
## PC4 5        6.499234e-02
## PC5 5       -9.222360e-03
## PC6 5        4.008269e-03
## PC7 5       -5.837688e-02
## PC8 5       -6.766176e-02
## PC9 5       -3.978427e-02
## PC10 5      -1.780858e-01
## PC11 5       8.144092e-02
## PC12 5      -3.139836e-02
## PC13 5       1.321293e-01
## PC14 5       8.191926e-02
## PC15 5       5.279674e-02
## PC16 5      -1.876404e-01
## PC17 5      -7.142067e-02
## PC18 5      -3.805614e-02
## PC19 5      -1.232697e-01
## PC20 5      -5.269054e-02
## PC21 5      -7.570913e-03
## PC22 5      -3.405271e-02
## PC23 5       9.213426e-03
## PC24 5      -9.577193e-02
## PC25 5      -1.532110e-02
## PC26 5      -1.403352e-01
## PC27 5       5.425957e-03
## PC28 5      -1.622033e-02
## PC1 6        3.588594e-03
## PC2 6       -2.045739e-02
## PC3 6        5.767028e-03
## PC4 6        1.112235e-02
## PC5 6       -2.776367e-02
## PC6 6       -7.281052e-02
## PC7 6       -8.711379e-03
## PC8 6       -8.509841e-02
## PC9 6        1.013010e-02
## PC10 6       8.387139e-02
## PC11 6      -8.533196e-02
## PC12 6       4.007819e-02
## PC13 6       1.670806e-04
## PC14 6       2.892771e-02
## PC15 6       2.175684e-02
## PC16 6      -1.435865e-02
## PC17 6      -9.411298e-02
## PC18 6       1.380272e-02
## PC19 6       2.520344e-02
```

```
## PC20 6       3.748807e-02
## PC21 6      -4.377718e-03
## PC22 6       8.462401e-03
## PC23 6      -1.841876e-02
## PC24 6       2.657352e-02
## PC25 6       3.085952e-02
## PC26 6      -9.445971e-02
## PC27 6       4.758358e-02
## PC28 6       5.932712e-02
## PC1 7        4.514601e-03
## PC2 7        7.035015e-02
## PC3 7       -1.896073e-02
## PC4 7       -3.498248e-02
## PC5 7        .
## PC6 7        9.730771e-02
## PC7 7        2.304886e-02
## PC8 7        5.897191e-02
## PC9 7       -1.249276e-01
## PC10 7      -8.564464e-02
## PC11 7      -1.635483e-02
## PC12 7      -2.466400e-02
## PC13 7       5.959525e-04
## PC14 7      -3.318224e-02
## PC15 7      -2.051584e-02
## PC16 7       7.318805e-02
## PC17 7       3.451146e-02
## PC18 7       2.784402e-02
## PC19 7       5.632350e-02
## PC20 7       1.734306e-02
## PC21 7      -8.390250e-02
## PC22 7      -3.097701e-03
## PC23 7       2.331698e-02
## PC24 7      -2.208602e-02
## PC25 7      -9.812845e-02
## PC26 7       6.659221e-02
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## PC12 8      -8.014566e-02
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## PC25 8      -7.284446e-02
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## PC10 9      -2.544983e-02
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## PC2 27       -7.516675e-02
## PC3 27       -9.968503e-02
## PC4 27       -8.763040e-02
## PC5 27        1.927631e-02
## PC6 27       -5.730600e-02
## PC7 27       -7.959813e-03
## PC8 27        5.911716e-02
## PC9 27        7.189860e-02
## PC10 27      -4.533407e-02
## PC11 27      -3.252778e-02
## PC12 27      -7.243963e-02
## PC13 27      -2.350919e-02
## PC14 27      -5.113383e-02
## PC15 27      -1.251732e-01
## PC16 27      -2.364256e-02
## PC17 27       4.036088e-02
## PC18 27       1.108404e-01
## PC19 27       1.706003e-02
## PC20 27      -5.841254e-03
## PC21 27       2.340687e-02
## PC22 27      -1.703217e-02
## PC23 27      -7.025620e-02
## PC24 27       3.167648e-02
## PC25 27      -4.459890e-02
```

```
## PC26 27    -1.053801e-01
## PC27 27     3.633948e-02
## PC28 27     1.487390e-02
## PC1 28     -1.366358e-04
## PC2 28     -4.695450e-02
## PC3 28      6.514557e-03
## PC4 28     -2.027651e-02
## PC5 28      3.507679e-02
## PC6 28     -7.151800e-03
## PC7 28      8.259935e-02
## PC8 28     -3.814896e-02
## PC9 28     -5.743892e-03
## PC10 28    -2.242573e-02
## PC11 28    -8.350106e-04
## PC12 28    -1.459155e-01
## PC13 28     1.343316e-01
## PC14 28    -3.437653e-02
## PC15 28     4.553058e-02
## PC16 28     1.488659e-02
## PC17 28     3.908352e-02
## PC18 28    -3.963349e-02
## PC19 28     2.632254e-02
## PC20 28    -3.330808e-02
## PC21 28     6.727342e-02
## PC22 28    -2.053088e-04
## PC23 28    -1.101710e-02
## PC24 28    -6.132952e-02
## PC25 28    -1.017498e-01
## PC26 28    -5.869028e-02
## PC27 28     5.076856e-02
## PC28 28    -1.420517e-02
## PC1 29      2.076103e-02
## PC2 29     -5.487607e-03
## PC3 29     -6.269838e-02
## PC4 29     -8.704719e-02
## PC5 29     -3.014366e-02
## PC6 29      3.341030e-02
## PC7 29      8.130257e-02
## PC8 29      1.790526e-04
## PC9 29     -3.908819e-02
## PC10 29    -7.223430e-02
## PC11 29    -2.206778e-02
## PC12 29     5.720048e-02
## PC13 29    -6.232528e-02
## PC14 29     1.073486e-02
## PC15 29     8.931229e-02
## PC16 29     3.274590e-02
## PC17 29     3.087171e-03
## PC18 29    -5.637485e-02
## PC19 29     6.940369e-02
## PC20 29    -1.185954e-01
## PC21 29     2.047680e-02
## PC22 29    -3.817636e-02
## PC23 29    -4.813833e-02
```

```
## PC24 29      5.826140e-04
## PC25 29     -2.333442e-02
## PC26 29      1.849286e-01
## PC27 29     -2.040757e-02
## PC28 29      2.780043e-02
## PC1 30      -3.545088e-02
## PC2 30       5.761307e-02
## PC3 30       3.170147e-02
## PC4 30       2.822273e-02
## PC5 30       8.832108e-02
## PC6 30      -2.324218e-02
## PC7 30      -4.919478e-02
## PC8 30      -5.091043e-03
## PC9 30      -6.829922e-03
## PC10 30     -3.570925e-02
## PC11 30      5.973912e-02
## PC12 30     -1.490457e-01
## PC13 30      1.756036e-01
## PC14 30      1.614889e-01
## PC15 30      5.145098e-02
## PC16 30      4.488362e-02
## PC17 30      1.478005e-01
## PC18 30     -4.719501e-03
## PC19 30     -1.739911e-02
## PC20 30      2.074021e-03
## PC21 30      7.337526e-02
## PC22 30      5.655295e-02
## PC23 30      3.476199e-02
## PC24 30      4.563529e-02
## PC25 30     -8.970967e-02
## PC26 30      1.968135e-02
## PC27 30     -7.418421e-02
## PC28 30     -3.078161e-02
## PC1 31      -6.520696e-03
## PC2 31       4.237282e-02
## PC3 31       6.661877e-02
## PC4 31       6.483112e-02
## PC5 31      -7.117881e-02
## PC6 31       6.886354e-03
## PC7 31       6.972020e-02
## PC8 31       4.895658e-02
## PC9 31       4.363351e-02
## PC10 31      5.347740e-02
## PC11 31     -4.520923e-02
## PC12 31      1.302707e-01
## PC13 31     -1.828192e-02
## PC14 31      1.580863e-01
## PC15 31     -3.888025e-02
## PC16 31     -6.223195e-02
## PC17 31      1.307100e-01
## PC18 31      3.840176e-02
## PC19 31      7.432989e-02
## PC20 31      7.277408e-02
## PC21 31     -4.504127e-02
```

```
## PC22 31      -4.080942e-02
## PC23 31      -1.827869e-02
## PC24 31       8.687767e-02
## PC25 31       9.051168e-02
## PC26 31       5.760397e-02
## PC27 31       1.214236e-02
## PC28 31       4.801092e-02
##              -2.645220e-04
##               1.259961e-04
##               1.194810e-05
##              -7.912867e-06
##              -1.538901e-04
##               2.290597e-04
##              -8.602907e-04
##               1.921541e-04
##               1.506476e-04
##               3.064680e-05
##              -4.231075e-04
##               6.885853e-05
##              -1.836303e-04
##              -5.424837e-05
##               2.743300e-04
##               6.804419e-05
##              -1.717614e-04
##               3.581118e-04
##               4.410996e-04
##              -1.062961e-13
##              -8.119055e-05
##              -1.020765e-05
##               2.356843e-04
##              -1.505570e-04
##              -7.912867e-06
##               9.142937e-05
##              -9.819137e-05
##               1.437038e-04
```

3c) Cross validation can be useful because it uses a test set (that is different from the training set) to assess the model from a training set. This will not be that helpful when the training set and the test set are highly correlated, because, in that case, the test set will be similar to the training set. The correlation within the dataset might be too high for time series data, so cross validation may not be that helpful in this case.

```r
prin_comp_test <- as.matrix(test) %*% pr.out$rotation

# Fit 30 Lassos on training set 2 and predict on the test set
pca_list_2 <- list()
lasso.pred <- list()
lasso_prediction <- as.vector(0)
for (i in 1:28)
{
  pca_list_2[[i]] <- as.matrix(test[32:1510,i])
  for (j in 1:31)
  {
    temp <- prin_comp_test[j:(j+1478),]
    colnames(temp) <- paste(colnames(temp),j,sep=" ")
```

```
    pca_list_2[[i]] <- cbind(pca_list_2[[i]],temp)
  }
}

for (i in 1:28)
{
  lasso_by_company <- glmnet(pca_list[[i]][,2:869],pca_list[[i]][,1],nlambda=1,lambda=bestlam,alpha=1)
  lasso.pred[[i]] <- predict(lasso_by_company,s=bestlam,newx=pca_list_2[[i]][,2:869])
  lasso_prediction <- rbind(lasso_prediction,lasso.pred[[i]])
}
lasso_prediction <- lasso_prediction[2:41413]

# Portfolio performance
portfolio <- matrix(0,nrow=1479,ncol=10)
y_test_pred <- rep(0,28)
y_test_real <- rep(0,28)
for (i in 1:nrow(portfolio))
{
  for (company in 1:28)
  {
    y_test_pred[company] <- lasso_prediction[i+1479*(company-1)]
    y_test_real[company] <- pca_list_2[[company]][i,1]
  }
  order_at_t <- order(abs(y_test_pred),decreasing = TRUE)
  real_return_ranked_by_absprediction <- y_test_real[order_at_t]*sign(y_test_pred[order_at_t])
  portfolio[i,] <- real_return_ranked_by_absprediction[1:10]
}

capital <- 100
for (t in 1:nrow(portfolio))
{
  capital <- capital + sum(portfolio[t,])*capital/10
  }
capital
```

```
## [1] 87.61239
```

```
# Compare with the market performance
market <- 100
for (t in 32:1510)
{
  market <- market * (1+rowMeans(test)[t])
  }
market
```

```
##      2799
## 195.9947
```

4) The strategy seems to have achieved a return of 87.67% over the whole period covered by the test set, which is about four years. The market achieved a return of 195.99% over the same time period. This means that the strategy did not perform very well and incurred a loss for the investor.