monthlydata

title: "LinearRegression" output: html_document

pred.lda <- predict(fit.lda, redwine.test) table(pred.lda$class, final_quality.test)

Test Accuracy

mean(pred.lda$class != final_quality.test)

#p-value<0.05, testing accuracy, 300 training, 12, go up to 4 degrees of freedom, cross-validation #Make sure to standardize before training the model, and test #270 training, 42 testi

```
set.seed(123)
data <- read.csv(file="Stats Project Data Gather - Sheet1_cum.csv")
datam <- data.frame(scale(data[, -c(1)]))
#datam <- data %>% mutate_each_(funs(scale(.) %>% as.vector), vars=c("y","z"))
datam$Date <- data$Date
datam$eq_raw <- data$CumulativeEqs
datam
```

```
##     CumulativeEqs DisposalVolume CumDisposalVolume  ProducedGas
## 1    -0.577811968   -0.812972598       -0.78312241 -0.897149612
## 2    -0.577811968   -0.812364285       -0.78207519 -0.896135289
## 3    -0.577811968   -0.811675480       -0.78101877 -0.895050082
## 4    -0.577811968   -0.811043648       -0.77995393 -0.894046460
## 5    -0.577811968   -0.810400630       -0.77888051 -0.893060565
## 6    -0.577811968   -0.809827138       -0.77779943 -0.892092211
## 7    -0.577811968   -0.809225417       -0.77671033 -0.891093957
## 8    -0.577811968   -0.808621800       -0.77561317 -0.890267651
## 9    -0.577811968   -0.808050313       -0.77450838 -0.889231401
## 10   -0.577811968   -0.807431749       -0.77339535 -0.888239316
## 11   -0.577811968   -0.806102942       -0.77226458 -0.887292394
## 12   -0.577811968   -0.804878638       -0.77111747 -0.886300521
## 13   -0.577811968   -0.803514392       -0.76995216 -0.885328672
## 14   -0.577811968   -0.802509829       -0.76877345 -0.884454683
## 15   -0.577811968   -0.801375037       -0.76757960 -0.883484523
## 16   -0.577811968   -0.800493765       -0.76637399 -0.882529393
## 17   -0.577811968   -0.799282878       -0.76515222 -0.881544003
## 18   -0.577811968   -0.798339989       -0.76391787 -0.880577933
## 19   -0.577811968   -0.797026415       -0.76266599 -0.879585439
## 20   -0.577811968   -0.796092434       -0.76140165 -0.878598620
## 21   -0.577811968   -0.794922826       -0.76012170 -0.877651345
## 22   -0.577811968   -0.794008997       -0.75882956 -0.876674052
## 23   -0.577811968   -0.793576811       -0.75753165 -0.875739349
## 24   -0.577811968   -0.793102149       -0.75622741 -0.874770881
## 25   -0.577811968   -0.792630754       -0.75491688 -0.873808931
## 26   -0.577811968   -0.792196268       -0.75360056 -0.872949739
## 27   -0.577811968   -0.791741029       -0.75227815 -0.871982258
## 28   -0.577811968   -0.791269955       -0.75094947 -0.871065251
## 29   -0.577811968   -0.790797118       -0.74961447 -0.870090180
## 30   -0.577811968   -0.790327087       -0.74827320 -0.869129215
```

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## 31   -0.577811968   -0.789900667       -0.74692624 -0.868114830
## 32   -0.577811968   -0.789433967       -0.74557306 -0.867103234
## 33   -0.577811968   -0.788985742       -0.74421389 -0.866111196
## 34   -0.577811968   -0.788510412       -0.74284838 -0.865483404
## 35   -0.577811968   -0.788034985       -0.74147653 -0.864439351
## 36   -0.577811968   -0.787562130       -0.74009837 -0.863372550
## 37   -0.577811968   -0.787083101       -0.73871381 -0.862306141
## 38   -0.577811968   -0.786643452       -0.73732340 -0.861319644
## 39   -0.577811968   -0.786149084       -0.73592638 -0.860264576
## 40   -0.577811968   -0.785648361       -0.73452268 -0.859249602
## 41   -0.577811968   -0.785161156       -0.73311248 -0.858205655
## 42   -0.577811968   -0.784667855       -0.73169570 -0.857200011
## 43   -0.577811968   -0.784165859       -0.73027222 -0.856182934
## 44   -0.577811968   -0.783647869       -0.72884183 -0.855132295
## 45   -0.577811968   -0.783168697       -0.72740505 -0.854122115
## 46   -0.577811968   -0.782647852       -0.72596132 -0.853075165
## 47   -0.577811968   -0.782142231       -0.72451083 -0.852107508
## 48   -0.577811968   -0.781637160       -0.72305361 -0.851087928
## 49   -0.577811968   -0.781177802       -0.72159027 -0.850058047
## 50   -0.577811968   -0.780770544       -0.72012148 -0.849114581
## 51   -0.577811968   -0.780286436       -0.71864624 -0.848077545
## 52   -0.577811968   -0.779810237       -0.71716464 -0.847079337
## 53   -0.577811968   -0.779315436       -0.71567644 -0.846048288
## 54   -0.577811968   -0.778876181       -0.71418238 -0.845078820
## 55   -0.577811968   -0.778443776       -0.71268255 -0.844087573
## 56   -0.577811968   -0.777981022       -0.71117655 -0.843026053
## 57   -0.577811968   -0.777516585       -0.70966435 -0.841981332
## 58   -0.577811968   -0.777041020       -0.70814580 -0.840919020
## 59   -0.577811968   -0.776589626       -0.70662123 -0.839889110
## 60   -0.577811968   -0.776140890       -0.70509068 -0.838832556
## 61   -0.577811968   -0.775727908       -0.70355461 -0.837773299
## 62   -0.577811968   -0.775416628       -0.70201439 -0.836814654
## 63   -0.577811968   -0.775028168       -0.70046898 -0.835768586
## 64   -0.577811968   -0.774690152       -0.69891907 -0.834742824
## 65   -0.577811968   -0.774317563       -0.69736418 -0.833664723
## 66   -0.577811968   -0.773924359       -0.69580405 -0.832596008
## 67   -0.577811968   -0.773506079       -0.69423833 -0.831501499
## 68   -0.577811968   -0.773082455       -0.69266697 -0.830411476
## 69   -0.577811968   -0.772690663       -0.69109037 -0.829360838
## 70   -0.577811968   -0.772280389       -0.68950830 -0.828258564
## 71   -0.577811968   -0.771891458       -0.68792104 -0.827200652
## 72   -0.577811968   -0.771515311       -0.68632877 -0.826199204
## 73   -0.577811968   -0.771223273       -0.68473259 -0.825141602
## 74   -0.577811968   -0.770936716       -0.68313260 -0.824184126
## 75   -0.577811968   -0.770638758       -0.68152862 -0.823122942
## 76   -0.577811968   -0.770352370       -0.67992083 -0.822108882
## 77   -0.577811968   -0.770015465       -0.67830854 -0.821042143
## 78   -0.577811968   -0.769708711       -0.67669215 -0.820009304
## 79   -0.577811968   -0.769378551       -0.67507137 -0.818921073
## 80   -0.577811968   -0.769060454       -0.67344633 -0.817948555
## 81   -0.577811968   -0.768723567       -0.67181680 -0.816828344
## 82   -0.577811968   -0.768374760       -0.67018262 -0.815618253
## 83   -0.577811968   -0.768034024       -0.66854389 -0.814419066
## 84   -0.577811968   -0.767662938       -0.66690021 -0.813160744
```

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## 85   -0.577811968   -0.767285485       -0.66525150 -0.811880796
## 86   -0.577811968   -0.766910443       -0.66359778 -0.810639122
## 87   -0.577811968   -0.766562182       -0.66193941 -0.809267525
## 88   -0.577811968   -0.766243758       -0.66027679 -0.807915769
## 89   -0.577811968   -0.765909013       -0.65860971 -0.806508754
## 90   -0.577811968   -0.765587500       -0.65693833 -0.805086631
## 91   -0.577811968   -0.765258096       -0.65526257 -0.803585037
## 92   -0.577811968   -0.764920141       -0.65358229 -0.802033240
## 93   -0.577811968   -0.764600665       -0.65189775 -0.800414991
## 94   -0.577811968   -0.764228900       -0.65020825 -0.798657479
## 95   -0.577811968   -0.763832161       -0.64851345 -0.797021730
## 96   -0.577811968   -0.763420830       -0.64681317 -0.795275518
## 97   -0.577811968   -0.762994722       -0.64510720 -0.793525567
## 98   -0.577811968   -0.762596265       -0.64339591 -0.791887986
## 99   -0.577811968   -0.762127056       -0.64167837 -0.790087264
## 100  -0.577811968   -0.761667447       -0.63995469 -0.788216651
## 101  -0.577811968   -0.761195126       -0.63822470 -0.786217294
## 102  -0.577811968   -0.760733525       -0.63648856 -0.784246269
## 103  -0.577811968   -0.760293823       -0.63474656 -0.782239938
## 104  -0.577811968   -0.759840889       -0.63299851 -0.780046545
## 105  -0.577811968   -0.759394600       -0.63124450 -0.777847690
## 106  -0.577811968   -0.758982936       -0.62948500 -0.775545508
## 107  -0.577811968   -0.758507161       -0.62771915 -0.773247825
## 108  -0.577811968   -0.758066777       -0.62594743 -0.770709021
## 109  -0.577811968   -0.757555466       -0.62416888 -0.768072417
## 110  -0.577811968   -0.757085984       -0.62238407 -0.765608117
## 111  -0.577811968   -0.756554601       -0.62059217 -0.762802547
## 112  -0.577811968   -0.756072415       -0.61879384 -0.760064646
## 113  -0.577811968   -0.755576522       -0.61698889 -0.757051307
## 114  -0.577811968   -0.755057227       -0.61517700 -0.754083534
## 115  -0.577811968   -0.754432836       -0.61335679 -0.750978124
## 116  -0.577811968   -0.753710628       -0.61152694 -0.747817437
## 117  -0.577811968   -0.753069362       -0.60968854 -0.744736637
## 118  -0.577811968   -0.752305362       -0.60783994 -0.741412264
## 119  -0.577811968   -0.751641040       -0.60598248 -0.738169592
## 120  -0.577811968   -0.750853542       -0.60411451 -0.734795163
## 121  -0.577811968   -0.750058600       -0.60223593 -0.731312761
## 122  -0.577811968   -0.749153623       -0.60034527 -0.728104945
## 123  -0.577811968   -0.748053001       -0.59843993 -0.724424309
## 124  -0.577811968   -0.746807207       -0.59651797 -0.720821519
## 125  -0.577811968   -0.745456357       -0.59457799 -0.717018547
## 126  -0.577811968   -0.743905074       -0.59261730 -0.713216268
## 127  -0.577811968   -0.742331243       -0.59063561 -0.709128403
## 128  -0.577811968   -0.740380662       -0.58862790 -0.705020926
## 129  -0.577811968   -0.738630660       -0.58659684 -0.700901039
## 130  -0.577811968   -0.737141936       -0.58454591 -0.696552040
## 131  -0.577811968   -0.735742010       -0.58247630 -0.692262439
## 132  -0.577811968   -0.734206647       -0.58038621 -0.687758642
## 133  -0.577811968   -0.732487131       -0.57827317 -0.683208490
## 134  -0.577811968   -0.730933742       -0.57613941 -0.678909684
## 135  -0.577811968   -0.729226043       -0.57398286 -0.674326399
## 136  -0.577811968   -0.727571793       -0.57180423 -0.669735358
## 137  -0.577811968   -0.725515415       -0.56959817 -0.664955569
## 138  -0.577811968   -0.723619733       -0.56736681 -0.660338343
```

```
## 139  -0.577811968   -0.721740501       -0.56511038 -0.655525433
## 140  -0.577811968   -0.719538671       -0.56282457 -0.650602926
## 141  -0.577811968   -0.717437752       -0.56051073 -0.645712981
## 142  -0.577811968   -0.715176191       -0.55816671 -0.640571795
## 143  -0.577811968   -0.712540818       -0.55578752 -0.635489943
## 144  -0.577811968   -0.710230530       -0.55337751 -0.630223476
## 145  -0.577811968   -0.707795701       -0.55093501 -0.624912802
## 146  -0.577811968   -0.705599501       -0.54846321 -0.619871398
## 147  -0.577811968   -0.702678356       -0.54595243 -0.614136604
## 148  -0.577811968   -0.699300139       -0.54339657 -0.608507452
## 149  -0.577811968   -0.696082530       -0.54079778 -0.602627342
## 150  -0.577811968   -0.692747697       -0.53815449 -0.596686020
## 151  -0.577811968   -0.689216859       -0.53546409 -0.590343854
## 152  -0.577811968   -0.685605659       -0.53272550 -0.583698716
## 153  -0.577811968   -0.682430876       -0.52994456 -0.577279764
## 154  -0.577811968   -0.678647537       -0.52711313 -0.570428616
## 155  -0.577811968   -0.674907863       -0.52423180 -0.563392167
## 156  -0.577811968   -0.670588143       -0.52129283 -0.556014604
## 157  -0.577811968   -0.666148181       -0.51829462 -0.548503915
## 158  -0.577811968   -0.661987024       -0.51524089 -0.541632730
## 159  -0.577811968   -0.656609258       -0.51211540 -0.533791138
## 160  -0.577811968   -0.651062369       -0.50891590 -0.525889086
## 161  -0.577811968   -0.644809018       -0.50563295 -0.517404836
## 162  -0.577811968   -0.638479882       -0.50226556 -0.509059423
## 163  -0.577811968   -0.631664460       -0.49880723 -0.500305275
## 164  -0.577811968   -0.623852046       -0.49524465 -0.491373041
## 165  -0.577811968   -0.615909595       -0.49157610 -0.482310249
## 166  -0.577811968   -0.607413548       -0.48779418 -0.472784822
## 167  -0.577811968   -0.598640053       -0.48389520 -0.463454065
## 168  -0.577811968   -0.588419698       -0.47985984 -0.453414967
## 169  -0.577811968   -0.578544674       -0.47569272 -0.443220359
## 170  -0.577811968   -0.568943671       -0.47139750 -0.433699629
## 171  -0.577811968   -0.557494305       -0.46694950 -0.422565635
## 172  -0.577811968   -0.545743721       -0.46234471 -0.411366741
## 173  -0.577811968   -0.532561369       -0.45756403 -0.399226169
## 174  -0.577811968   -0.519216608       -0.45260528 -0.387018670
## 175  -0.577811968   -0.504439081       -0.44744936 -0.373856873
## 176  -0.577811968   -0.489146964       -0.44253343 -0.359462631
## 177  -0.577811968   -0.474147498       -0.43727761 -0.345924940
## 178  -0.577811968   -0.457946692       -0.43026985 -0.331033479
## 179  -0.577811968   -0.440848582       -0.42501404 -0.316142019
## 180  -0.577811968   -0.424026403       -0.41800628 -0.299896789
## 181  -0.577811968   -0.407018769       -0.41275046 -0.283651560
## 182  -0.577811968   -0.388251001       -0.40574271 -0.267406330
## 183  -0.577811968   -0.366430556       -0.39873495 -0.251161101
## 184  -0.577811968   -0.346009659       -0.39172720 -0.233562102
## 185  -0.577811968   -0.323090776       -0.38296750 -0.215963103
## 186  -0.577811968   -0.301374424       -0.37595975 -0.198364105
## 187  -0.577811968   -0.278415512       -0.36720005 -0.179411337
## 188  -0.577811968   -0.254927083       -0.35844036 -0.160458569
## 189  -0.577811968   -0.231984803       -0.34968066 -0.141505801
## 190  -0.465410855   -0.207677044       -0.34092097 -0.121199264
## 191  -0.437310577   -0.183136344       -0.33216127 -0.100892728
## 192  -0.437310577   -0.159402822       -0.32164964 -0.080586191
```

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## 193  -0.437310577   -0.135357918       -0.31113801 -0.058925885
## 194  -0.437310577   -0.113037677       -0.30062637 -0.039973117
## 195  -0.437310577   -0.089346302       -0.29011474 -0.018312811
## 196  -0.437310577   -0.067314354       -0.27960311  0.001993726
## 197  -0.381110021   -0.045563193       -0.26909147  0.022300263
## 198  -0.296809187   -0.025064828       -0.25682790  0.042606800
## 199  -0.282759048   -0.002759071       -0.24456433  0.062913337
## 200  -0.282759048    0.017734113       -0.23230076  0.083219874
## 201  -0.268708909    0.037733122       -0.22003718  0.102172642
## 202  -0.254658770    0.058676463       -0.20777361  0.122479179
## 203  -0.254658770    0.079171907       -0.19551004  0.141431946
## 204  -0.240608631    0.099702300       -0.18149453  0.160384714
## 205  -0.240608631    0.121522478       -0.16747902  0.180691251
## 206  -0.240608631    0.141488184       -0.15521544  0.198290250
## 207  -0.240608631    0.164734965       -0.14119993  0.219950556
## 208  -0.240608631    0.187670380       -0.12543248  0.238903324
## 209  -0.240608631    0.211152920       -0.11141697  0.259209861
## 210  -0.240608631    0.234055451       -0.09564952  0.279516398
## 211  -0.240608631    0.258911355       -0.08163401  0.301176704
## 212  -0.240608631    0.283585941       -0.06586656  0.322837010
## 213  -0.240608631    0.307991743       -0.05009911  0.344497316
## 214  -0.240608631    0.329817009       -0.03257972  0.366157622
## 215  -0.212508353    0.353477342       -0.01681227  0.387817928
## 216  -0.212508353    0.377317279        0.00070712  0.410832003
## 217  -0.212508353    0.400814116        0.01822651  0.432492309
## 218  -0.212508353    0.421229544        0.03574590  0.451445077
## 219  -0.212508353    0.447181725        0.05326529  0.469044075
## 220  -0.212508353    0.473955914        0.07078468  0.496119458
## 221  -0.212508353    0.501303595        0.09005600  0.523194841
## 222  -0.184408075    0.526696819        0.10932733  0.536732532
## 223  -0.170357936    0.552609344        0.12859866  0.563807914
## 224  -0.142257658    0.578555553        0.14786999  0.590883297
## 225  -0.128207519    0.603767709        0.16714132  0.604420988
## 226  -0.128207519    0.632940699        0.18816458  0.631496371
## 227  -0.128207519    0.658901563        0.20918785  0.658571753
## 228  -0.114157380    0.685039070        0.23021112  0.685647136
## 229  -0.100107241    0.711660365        0.25123438  0.699184827
## 230  -0.100107241    0.736550651        0.27225765  0.726260210
## 231  -0.100107241    0.763498069        0.29503286  0.753335592
## 232  -0.100107241    0.788277759        0.31780806  0.766873284
## 233  -0.100107241    0.813588724        0.34058327  0.793948666
## 234  -0.001756267    0.837029702        0.36335848  0.821024049
## 235   0.082544567    0.861597848        0.38613368  0.834561740
## 236   0.082544567    0.885862633        0.41066083  0.861637123
## 237   0.110644845    0.908497251        0.43343603  0.888712505
## 238   0.138745123    0.931851927        0.45796318  0.915787888
## 239   0.152795262    0.953047301        0.48249032  0.929325579
## 240   0.166845401    0.974401373        0.50876941  0.956400962
## 241   0.180895540    0.997188950        0.53329655  0.969938653
## 242   0.223045957    1.017731905        0.55782369  0.997014036
## 243   0.265196374    1.040625324        0.58410278  1.010551727
## 244   0.279246513    1.062662074        0.61038186  1.037627109
## 245   0.279246513    1.085078693        0.63666095  1.051164801
## 246   0.279246513    1.106395848        0.66294003  1.078240183
```

```
## 247   0.279246513    1.129136429        0.69097105  1.105315566
## 248   0.279246513    1.150728628        0.71725014  1.118853257
## 249   0.279246513    1.171558617        0.74528116  1.145928640
## 250   0.293296652    1.192857251        0.77331218  1.159466331
## 251   0.588349572    1.212992998        0.80134320  1.186541713
## 252   0.700750684    1.231706542        0.82937423  1.200079405
## 253   0.742901101    1.251289289        0.85740525  1.227154787
## 254   0.756951240    1.268543495        0.88718821  1.240692479
## 255   0.756951240    1.288937908        0.91521923  1.254230170
## 256   0.771001379    1.308811533        0.94500219  1.281305552
## 257   0.771001379    1.329288839        0.96777740  1.294843244
## 258   0.771001379    1.349024533        1.00281618  1.321918626
## 259   0.785051518    1.368554982        1.03785496  1.335456318
## 260   0.785051518    1.387830788        1.07289374  1.362531700
## 261   0.827201935    1.406187689        1.09041312  1.376069391
## 262   0.855302213    1.424793058        1.12545190  1.389607083
## 263   0.967703326    1.443157139        1.16049068  1.416682465
## 264   1.080104438    1.466012014        1.19552946  1.430220157
## 265   1.445408053    1.483697569        1.21304885  1.443757848
## 266   1.459458192    1.499290367        1.24808763  1.470833230
## 267   1.529708887    1.517188518        1.28312641  1.484370922
## 268   1.599959582    1.533930059        1.31816518  1.497908613
## 269   1.712360694    1.551622080        1.35320396  1.511446304
## 270   1.768561250    1.568046441        1.38824274  1.538521687
## 271   1.810711667    1.583781797        1.42328152  1.552059378
## 272   1.866912223    1.598595047        1.44080091  1.565597069
## 273   1.951213058    1.612169434        1.47583969  1.579134761
## 274   2.091714448    1.626637064        1.51087846  1.606210143
## 275   2.133864865    1.641011648        1.54591724  1.619747835
## 276   2.232215838    1.655541388        1.58095602  1.633285526
## 277   2.246265977    1.670015180        1.61599480  1.646823217
## 278   2.260316116    1.683607075        1.65103358  1.660360908
## 279   2.260316116    1.697379840        1.68607236  1.673898600
## 280   2.260316116    1.710621948        1.72111113  1.687436291
## 281   2.260316116    1.725085565        1.75614991  1.714511674
## 282   2.260316116    1.739258671        1.79118869  1.728049365
## 283   2.260316116    1.753533860        1.82622747  1.741587056
## 284   2.260316116    1.767787136        1.86126625  1.755124747
## 285   2.288416394    1.781139006        1.89630503  1.768662439
## 286   2.288416394    1.794573985        1.93134380  1.782200130
## 287   2.288416394    1.807770549        1.96638258  1.795737821
## 288   2.288416394    1.820895964        2.00142136  1.809275512
## 289   2.288416394    1.834261311        2.03646014  1.822813204
## 290   2.288416394    1.846363028        2.07149892  1.835987152
## 291   2.288416394    1.859281558        2.12405708  1.849888586
## 292   2.288416394    1.871972225        2.15909586  1.863137793
## 293   2.302466533    1.885154164        2.19413464  1.876963969
## 294   2.316516672    1.897814757        2.22917342  1.889915714
## 295   2.316516672    1.910809530        2.26421220  1.903292810
## 296   2.330566811    1.924084222        2.29925098  1.916455069
## 297   2.358667089    1.936742859        2.33428975  1.929105431
## 298   2.358667089    1.949859139        2.36932853  1.942156561
## 299   2.358667089    1.962842426        2.42188670  1.954715301
## 300   2.358667089    1.975744411        2.45692548  1.967812050
```

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## 301   2.372717228    1.988212735        2.49196426  1.980411647
## 302   2.372717228    1.999931270        2.52700303  1.991957024
## 303   2.372717228    2.012808304        2.56204181  2.004664987
## 304   2.372717228    2.024360999        2.61459998  2.016872741
## 305   2.386767367    2.035716514        2.64963876  2.029612014
## 306   2.386767367    2.046599520        2.68467754  2.041905244
## 307   2.400817506    2.057880576        2.71971631  2.054248846
## 308   2.414867645    2.069359407        2.77227448  2.066561377
## 309   2.414867645    2.080623685        2.80731326  2.078431784
## 310   2.414867645    2.081269449        2.84235204  2.090652832
## 311   2.414867645    2.092533727        2.87739082  2.102264675
## 312   2.414867645    2.103798005        2.92994898  2.114128523
##     CumProducedGas   ProducedOil Cum_ProducedOil ProducedWater
## 1     -0.897193758 -0.4908034853    -1.353791525   -0.90944028
## 2     -0.896179296 -0.4625535911    -1.345898254   -0.91137744
## 3     -0.895093940 -0.4006224046    -1.337734397   -0.91003119
## 4     -0.894090180 -0.6980411320    -1.330870000   -0.91662299
## 5     -0.893104150 -0.6511125271    -1.323800567   -0.92162842
## 6     -0.892135663 -0.6777561846    -1.316847543   -0.92424094
## 7     -0.891137271 -0.6954413469    -1.309971787   -0.92405759
## 8     -0.890310853 -0.8320211400    -1.303692766   -0.92567659
## 9     -0.889274460 -0.7486624254    -1.297049540   -0.92336441
## 10    -0.888282239 -0.7032407022    -1.290207860   -0.92428290
## 11    -0.887335187 -0.7193858645    -1.283436721   -0.92709331
## 12    -0.886343177 -0.6948452179    -1.276558361   -0.92593092
## 13    -0.885371195 -0.5142512286    -1.268890963   -0.92249637
## 14    -0.884497087 -0.7675564050    -1.262330288   -0.92811896
## 15    -0.883526793 -0.5543409084    -1.254838047   -0.92360553
## 16    -0.882571532 -0.5448359616    -1.247304277   -0.91789178
## 17    -0.881586007 -0.4296836967    -1.239267393   -0.91634494
## 18    -0.880619803 -0.5837168241    -1.231903499   -0.91899715
## 19    -0.879627174 -0.6047303738    -1.224631416   -0.92067317
## 20    -0.878640219 -0.6171497294    -1.217413595   -0.92087477
## 21    -0.877692814 -0.7622574799    -1.210829767   -0.92720198
## 22    -0.876715387 -0.6649228505    -1.203820673   -0.92669685
## 23    -0.875780555 -0.6974284438    -1.196953599   -0.92794856
## 24    -0.874811955 -0.7382798441    -1.190265010   -0.92871214
## 25    -0.873849872 -0.6427170427    -1.183158895   -0.92406474
## 26    -0.872990562 -0.8720777015    -1.177054886   -0.92856866
## 27    -0.872022949 -0.7070161863    -1.170229703   -0.92391932
## 28    -0.871105815 -0.7593761894    -1.163633286   -0.92217249
## 29    -0.870130611 -0.8227811395    -1.157313894   -0.92250117
## 30    -0.869169514 -0.8895972725    -1.151286430   -0.92527255
## 31    -0.868154990 -0.8787510353    -1.145211578   -0.92460527
## 32    -0.867143255 -0.8689977014    -1.139094111   -0.92280301
## 33    -0.866151081 -0.9390759851    -1.133282826   -0.92413438
## 34    -0.865523202 -1.0796796494    -1.128085856   -0.92800668
## 35    -0.864479006 -0.8601054428    -1.121929538   -0.92291454
## 36    -0.863412059 -0.8707860886    -1.115819886   -0.92243313
## 37    -0.862345503 -0.8683518949    -1.109699598   -0.92324103
## 38    -0.861358871 -0.9585495346    -1.103973395   -0.92549341
## 39    -0.860303658 -0.8750252286    -1.097882264   -0.92439653
## 40    -0.859288545 -0.9117699620    -1.091951675   -0.91438566
## 41    -0.858244454 -0.9882897515    -1.086355411   -0.91391880
```

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## 42    -0.857238672 -1.0105617958    -1.080856456   -0.91607900
## 43    -0.856221456 -1.0709364231    -1.075621286   -0.91370274
## 44    -0.855170672 -1.0488465293    -1.070289601   -0.91369021
## 45    -0.854160354 -1.0741323372    -1.065068394   -0.91607783
## 46    -0.853113259 -1.0003613651    -1.059524872   -0.91248332
## 47    -0.852145470 -1.0711848102    -1.054290787   -0.91365497
## 48    -0.851125750 -0.9402351250    -1.048484566   -0.91275783
## 49    -0.850095727 -1.0165893230    -1.043011946   -0.91297011
## 50    -0.849152132 -1.1417433090    -1.038086140   -0.91777420
## 51    -0.848114953 -1.0341088940    -1.032690065   -0.91539230
## 52    -0.847116609 -1.1137583611    -1.027641989   -0.91932600
## 53    -0.846085418 -1.1349706204    -1.022686592   -0.91822819
## 54    -0.845115817 -1.1989220221    -1.018010606   -0.92255314
## 55    -0.844124433 -1.2105299798    -1.013385337   -0.91951330
## 56    -0.843062768 -1.2201673997    -1.008802176   -0.91973945
## 57    -0.842017903 -1.2424725623    -1.004316468   -0.91588254
## 58    -0.840955446 -1.1433495457    -0.999397679   -0.91209459
## 59    -0.839925395 -1.1268897597    -0.994406976   -0.91439264
## 60    -0.838868695 -1.0900953489    -0.989255513   -0.91257213
## 61    -0.837809293 -1.0655050249    -0.983996612   -0.90910908
## 62    -0.836850516 -1.1823297630    -0.979248133   -0.91345816
## 63    -0.835804305 -1.0644286807    -0.973984529   -0.91040604
## 64    -0.834778401 -1.1562987937    -0.969122317   -0.91281241
## 65    -0.833700153 -1.1554211593    -0.964256271   -0.91039822
## 66    -0.832631291 -1.2469600895    -0.959790170   -0.91006491
## 67    -0.831536631 -1.2456353582    -0.955318281   -0.91176415
## 68    -0.830446459 -1.2225022385    -0.950745320   -0.91382662
## 69    -0.829395677 -1.2298710562    -0.946204555   -0.91615764
## 70    -0.828293252 -1.2319409488    -0.941672833   -0.91531509
## 71    -0.827235195 -1.2433336376    -0.937190888   -0.91631794
## 72    -0.826233609 -1.2978297699    -0.932947043   -0.91987284
## 73    -0.825175861 -1.2374717018    -0.928439485   -0.91938622
## 74    -0.824218255 -1.3656725697    -0.924492054   -0.92358173
## 75    -0.823156924 -1.1905596560    -0.919779532   -0.91887545
## 76    -0.822142725 -1.2971011677    -0.915532504   -0.91896023
## 77    -0.821075839 -1.2881592317    -0.911246407   -0.91415791
## 78    -0.820042859 -1.3092721362    -0.907052555   -0.91619011
## 79    -0.818954478 -1.3218239649    -0.902913543   -0.91255371
## 80    -0.817981827 -1.3610691285    -0.898945999   -0.92043188
## 81    -0.816861462 -1.3009925658    -0.894715972   -0.91677513
## 82    -0.815651205 -1.2269069700    -0.890162256   -0.91297802
## 83    -0.814451853 -1.2602901978    -0.885754396   -0.91393840
## 84    -0.813193358 -1.1661183642    -0.880935087   -0.91162361
## 85    -0.811913235 -1.2153983672    -0.876331089   -0.90976668
## 86    -0.810671390 -1.2045852482    -0.871679847   -0.90988283
## 87    -0.809299605 -1.1955605165    -0.866989175   -0.90328161
## 88    -0.807947663 -1.1778587950    -0.862221161   -0.90166985
## 89    -0.806540455 -1.1742820206    -0.857437520   -0.90348354
## 90    -0.805118137 -1.2847480487    -0.853136520   -0.90447681
## 91    -0.803616337 -1.2510998747    -0.848688506   -0.90185000
## 92    -0.802064327 -1.2388129922    -0.844186809   -0.90676342
## 93    -0.800445856 -1.3178663302    -0.840030506   -0.90961319
## 94    -0.798688102 -1.1850123438    -0.835293747   -0.90011040
## 95    -0.797052129 -1.2092383668    -0.830662835   -0.90349187
```

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## 96    -0.795305677 -1.1764347089    -0.825888600   -0.89674557
## 97    -0.793555486 -1.0315919046    -0.820481528   -0.89827357
## 98    -0.791917680 -1.1942192261    -0.815784996   -0.90278161
## 99    -0.790116710 -1.0155460972    -0.810307818   -0.89238597
## 100   -0.788245841 -1.1104299738    -0.805245199   -0.89429849
## 101   -0.786246210 -0.9612155563    -0.799530645   -0.88970180
## 102   -0.784274914 -1.0270712592    -0.794103822   -0.89430320
## 103   -0.782268308 -1.0413121202    -0.788739219   -0.89688847
## 104   -0.780074613 -1.0051303976    -0.783216533   -0.89353979
## 105   -0.777875456 -0.9814011489    -0.777590172   -0.89329925
## 106   -0.775572958 -0.7496890921    -0.770951432   -0.89081769
## 107   -0.773274960 -0.7399191990    -0.764270005   -0.89583835
## 108   -0.770735807 -0.5026267118    -0.756551819   -0.88881619
## 109   -0.768098842 -0.2226116413    -0.747610211   -0.88768373
## 110   -0.765634202 -0.3628675637    -0.739281399   -0.89456409
## 111   -0.762828248 -0.2413565887    -0.730421690   -0.88346610
## 112   -0.760089971 -0.4999938084    -0.722692000   -0.88032238
## 113   -0.757076218 -0.3238376689    -0.714192661   -0.87357760
## 114   -0.754108038 -0.4192183197    -0.706110053   -0.87408105
## 115   -0.751002201 -0.4123297172    -0.697997347   -0.86629649
## 116   -0.747841080 -0.4269845567    -0.689948670   -0.86539641
## 117   -0.744759858 -0.3247153033    -0.681453166   -0.86190442
## 118   -0.741435028 -0.1441544324    -0.672168769   -0.86100300
## 119   -0.738191911 -0.1560107771    -0.662936174   -0.86898697
## 120   -0.734817019  0.0335085890    -0.652875545   -0.87414084
## 121   -0.731334138  0.1680184895    -0.642227225   -0.87030521
## 122   -0.728125882 -0.1342686253    -0.632899636   -0.87959691
## 123   -0.724444740  0.1641767688    -0.622268101   -0.86921935
## 124   -0.720841456 -0.0373148561    -0.612516909   -0.87217584
## 125   -0.717037962 -0.0495023837    -0.602818965   -0.87137635
## 126   -0.713235161 -0.0761294821    -0.593237358   -0.86807932
## 127   -0.709146734 -0.1090324948    -0.583799509   -0.86473771
## 128   -0.705038694 -0.2129742214    -0.574815794   -0.84921031
## 129   -0.700918241  0.0137866523    -0.564841333   -0.84782041
## 130   -0.696568645 -0.0387720605    -0.555096507   -0.84124207
## 131   -0.692278454  0.2207427937    -0.544217828   -0.84266855
## 132   -0.687774039  0.2868137654    -0.533050477   -0.83892299
## 133   -0.683223262  0.1963180610    -0.522278513   -0.83648567
## 134   -0.678923867  0.1624380590    -0.511654575   -0.84465079
## 135   -0.674339952  0.3174481758    -0.500353379   -0.82431207
## 136   -0.669748281  0.2052268788    -0.489542491   -0.78352327
## 137   -0.664967836  0.2037862335    -0.478737898   -0.79182339
## 138   -0.660349975  0.0005558988    -0.468821243   -0.80079011
## 139   -0.655536405  0.1932380609    -0.458062736   -0.77144682
## 140   -0.650613222  0.1826070925    -0.447350677   -0.77611365
## 141   -0.645722605  0.1128931098    -0.436943207   -0.76643230
## 142   -0.640580713  0.2013354807    -0.426149321   -0.76035976
## 143   -0.635498164  0.1066668729    -0.415769055   -0.76477983
## 144   -0.630230974  0.2126619330    -0.404925682   -0.75560159
## 145   -0.624919571  0.2995477446    -0.393702695   -0.75052071
## 146   -0.619877475  0.1331283799    -0.383206814   -0.76883800
## 147   -0.614141893  0.6063886231    -0.370643201   -0.69532217
## 148   -0.608511969  0.5144357144    -0.358481341   -0.69221824
## 149   -0.602631051  0.4650397975    -0.346535298   -0.67485309
```

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## 150   -0.596688913  0.3033232287    -0.335295815   -0.67391609
## 151   -0.590345876  0.3816148463    -0.323714266   -0.63814324
## 152   -0.583699826  0.3306126927    -0.312355552   -0.57000374
## 153   -0.577279993  0.1108066581    -0.301957198   -0.55410687
## 154   -0.570427904  0.5065370043    -0.289829849   -0.53938998
## 155   -0.563390490  0.5586817386    -0.277474673   -0.49511424
## 156   -0.556011914  0.7857241177    -0.264127520   -0.36777504
## 157   -0.548500193  1.0707069304    -0.249535242   -0.40221291
## 158   -0.541628064  0.5855572240    -0.237062643   -0.49430852
## 159   -0.533785396  0.6097004513    -0.224484560   -0.39049247
## 160   -0.525882259  0.6387120659    -0.211779721   -0.33198949
## 161   -0.517396845  0.6970002414    -0.198820214   -0.32104154
## 162   -0.509050286  0.1553176285    -0.188227386   -0.37485220
## 163   -0.500294935  0.5165056070    -0.176056483   -0.25962520
## 164   -0.491361476  0.4496563557    -0.164177652   -0.28749298
## 165   -0.482297439  0.5341742102    -0.151929552   -0.25041341
## 166   -0.472770704  1.0422914448    -0.137461425   -0.25861646
## 167   -0.463438666  0.7189907804    -0.124405838   -0.35104824
## 168   -0.453398190  1.3259826445    -0.108698228   -0.32033557
## 169   -0.443202182  1.0432353158    -0.094225977   -0.29661865
## 170   -0.433680144  1.1180495138    -0.079426853   -0.34687543
## 171   -0.422544623  1.0905778993    -0.064747756   -0.16965136
## 172   -0.411344190  1.2041404867    -0.049572489    0.10006949
## 173   -0.399201952  1.1893531740    -0.034461831    0.20162517
## 174   -0.386992777  1.0691503711    -0.019876353    0.09437070
## 175   -0.373829172  0.9531867083    -0.005797535    0.10262977
## 176   -0.359748040  1.0039073565     0.008502887   -0.01031868
## 177   -0.345802304  1.0055467114     0.022810473    0.05743175
## 178   -0.330908799  1.1386325258     0.037699526    0.38623279
## 179   -0.315879899  1.5657755620     0.054454821    0.31641584
## 180   -0.299903230  1.5885774988     0.071309741    0.30231315
## 181   -0.283520374  1.9996912868     0.089960868    0.38427687
## 182   -0.267814496  1.5955323380     0.106846175    0.60258410
## 183   -0.250754663  2.1038814005     0.125952521    0.50788876
## 184   -0.233965621  1.8905003125     0.144126580    0.35065110
## 185   -0.215822624  2.0374958052     0.162942880    0.48429295
## 186   -0.198085814  1.7026865379     0.180296356    1.24636372
## 187   -0.179401235  1.5651463147     0.197048902    2.62402598
## 188   -0.160039678  1.7032164304     0.214404693    2.10946393
## 189   -0.141084308  1.4079007139     0.230470213    1.89863151
## 190   -0.120910379  1.9993766631     0.249119966    1.47005518
## 191   -0.101142636  1.9549650476     0.267575679    1.11942544
## 192   -0.080427125  2.1850874269     0.287036825    1.02322507
## 193   -0.059440822  2.5715280950     0.308186379    1.86193486
## 194   -0.040079266  2.0313689231     0.326975910    1.65950591
## 195   -0.018551381  2.3078568965     0.346973451    1.79138579
## 196    0.002028735  2.0654310756     0.365911803    1.77349246
## 197    0.022879642  1.8184183728     0.383770927    1.78758152
## 198    0.042782780  1.5594499702     0.400498585    1.79551082
## 199    0.063092105  1.3874998525     0.416474971    1.87168383
## 200    0.083130639  1.2826308139     0.431993171    2.06431368
## 201    0.102221404  1.0471598322     0.446482569    2.22818569
## 202    0.121989147  1.0415297243     0.460947369    4.03177627
## 203    0.141079913  1.3081484499     0.476577059    2.70165205
```

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## 204    0.160712260  1.1351716654     0.491450992    2.41993043
## 205    0.180750794  1.3051843637     0.507067731    1.61538392
## 206    0.199029187  0.9263277820     0.521029199    1.33222447
## 207    0.219473907  1.2747321038     0.536512889    1.54223982
## 208    0.238564673  1.0814206944     0.551151977    1.33222194
## 209    0.259415580  0.9913886461     0.565397704    0.95629666
## 210    0.279589509  0.5927604503     0.577901774    0.75545837
## 211    0.300981998  0.8954449844     0.591728311    0.88219303
## 212    0.322509882  0.9839370327     0.605941481    0.81227078
## 213    0.344037767  0.7880920748     0.619298980    0.77093261
## 214    0.366242629  1.1845675823     0.634388730    1.12056925
## 215    0.387905909  1.0907766090     0.649068695    1.45123033
## 216    0.410381562  1.2243591976     0.664332299    1.98293003
## 217    0.432586424  1.0424570362     0.678801150    1.88324582
## 218    0.451541794  0.6463292707     0.691539269    1.04197431
## 219    0.474423633  1.8106521357     0.709364461    1.73804123
## 220    0.496763891  1.0037417651     0.723664160    1.64985198
## 221    0.520051917  1.1000331687     0.738384569    1.65728995
## 222    0.542256778  0.8058434737     0.751819625    1.43190590
## 223    0.565003222  0.9157464910     0.765734862    1.33616170
## 224    0.587885062  0.9721634836     0.779896592    1.15299680
## 225    0.610631506  0.6790170145     0.792777528    1.18246439
## 226    0.634190323  0.9835064951     0.806988817    1.40696712
## 227    0.657478349  1.1213116646     0.821802193    1.49298312
## 228    0.681037166  1.4027508211     0.837845213    1.43171498
## 229    0.704189796  1.2804450074     0.853353863    1.33747153
## 230    0.725582285  1.1347080094     0.868225770    1.21245881
## 231    0.749141102  1.3219090959     0.883915582    1.38920391
## 232    0.771616755  0.9551241278     0.898002865    1.45594173
## 233    0.794904781  1.4390153394     0.914204329    1.50324546
## 234    0.817245038  0.7844987413     0.927546128    1.37271907
## 235    0.840803855  0.9582041280     0.941646867    1.24956883
## 236    0.864091881  0.6286937857     0.954307935    1.01732098
## 237    0.886567534  0.8288441202     0.967843485    0.92855016
## 238    0.909449374  0.8687185312     0.981553250    0.95308179
## 239    0.930029490  0.9346570298     0.995551110    0.91685672
## 240    0.951557374  0.9199028353     1.009484506    0.95854349
## 241    0.973491445  1.0427551007     1.023954659    0.90702852
## 242    0.993259188  1.0279346697     1.038360060    0.83892106
## 243    1.015057863  1.2643164043     1.053798243    1.07928483
## 244    1.035908770  1.1526912363     1.068748721    0.88952124
## 245    1.057436655  1.3222899561     1.084440197    0.76302796
## 246    1.078152166  0.8733219724     1.098170076    0.73255641
## 247    1.099544655  1.0453880041     1.112651732    0.85974313
## 248    1.120937144  0.8807735857     1.126414168    0.74159429
## 249    1.141517260  1.1777452163     1.141474110    0.67203881
## 250    1.162774354  1.2365632843     1.156791036    0.77285926
## 251    1.183083678  1.0804271460     1.171425783    0.76835500
## 252    1.202580630  1.2104991967     1.186628831    0.64780348
## 253    1.222483769  1.6968577204     1.203956841    0.79745641
## 254    1.240220579  0.9092718670     1.217843789    0.51419721
## 255    1.260123718  1.3664035071     1.233728003    0.69001859
## 256    1.279485274  1.0861897270     1.248387927    0.81487530
## 257    1.299253017  1.4079503913     1.264453665    1.01634858
```

```
## 258    1.318208387  1.0802284363     1.279087544    0.98101113
## 259    1.337434548  0.9896002589     1.293325457    0.99370533
## 260    1.356525314  0.7996337959     1.306733383    0.67261190
## 261    1.374803706  0.9976976787     1.321006674    0.61812184
## 262    1.393623681  0.7924802471     1.334383346    0.72201527
## 263    1.411631282  0.8690497140     1.348094558    0.88865749
## 264    1.430315861  1.0455867138     1.362577083    1.05029385
## 265    1.448594253  0.9615987518     1.376692654    0.79242322
## 266    1.464841713  0.3318380691     1.388056722    0.79672555
## 267    1.482578524  0.7848796015     1.401400185    1.05254556
## 268    1.499773752  0.4888849602     1.413450411    0.95413999
## 269    1.517239772  0.3025615082     1.424686566    1.00121739
## 270    1.533758023  0.0484118157     1.434812309    0.97058967
## 271    1.550682460  0.0340881589     1.444875470    1.02167874
## 272    1.567471502 -0.0371492647     1.454627386    0.95880127
## 273    1.583583567 -0.2484604601     1.463456057    0.79158201
## 274    1.599966422 -0.2160376624     1.472426387    0.70656575
## 275    1.615807696 -0.1822404561     1.481544382    0.60305920
## 276    1.631919760 -0.0475980825     1.491250645    0.60635724
## 277    1.647761033  0.0015660064     1.501171713    0.64165811
## 278    1.662654538 -0.0912148593     1.510687410    0.44799538
## 279    1.678360416 -0.0828028158     1.520239860    0.57142434
## 280    1.693389317 -0.4957712275     1.527987999    0.47227015
## 281    1.708959799 -0.3312396048     1.536454998    0.39773280
## 282    1.723582513 -0.5362748858     1.544026172    0.34352861
## 283    1.738611414 -0.7140869394     1.550820462    0.38416341
## 284    1.753369523 -0.7057245733     1.557651289    0.38946700
## 285    1.767450655 -0.8347368391     1.563918445    0.50929422
## 286    1.781937974 -0.7046482292     1.570753975    0.68443756
## 287    1.795748315 -0.6293372570     1.577918547    0.55504917
## 288    1.809694051 -0.5881215556     1.585263196    0.58341593
## 289    1.823639788 -0.6351495154     1.592402375    0.67398321
## 290    1.836318258 -0.6972628524     1.599270172    0.54845434
## 291    1.850128599 -0.5918473623     1.606598542    0.73610332
## 292    1.863472626 -0.7835194167     1.613089474    0.76263309
## 293    1.877147571 -0.8232944728     1.619406623    0.81078660
## 294    1.890254224 -0.9730719011     1.625069376    0.77351342
## 295    1.903633157 -1.0583845944     1.630359387    0.81464149
## 296    1.916797223 -1.0934734137     1.635496091    0.95964483
## 297    1.929449321 -0.9901940527     1.641084035    0.77316136
## 298    1.942502244 -1.0748774986     1.646301986    0.97298991
## 299    1.955062708 -0.8068015686     1.652691195    0.78395826
## 300    1.968161255 -0.8579361953     1.658856990    0.83820686
## 301    1.980762581 -0.7258770477     1.665599769    0.72883230
## 302    1.992309544 -0.8388931834     1.671848765    0.72949319
## 303    2.005019251 -0.6230779018     1.679040686    0.84174729
## 304    2.017228682 -0.7835359758     1.685531545    0.77350299
## 305    2.029969704 -0.6902417767     1.692430018    0.85204175
## 306    2.042264621 -1.1170039527     1.697463914    0.82231873
## 307    2.054609919 -0.9876936224     1.703062782    0.76895407
## 308    2.066924140 -0.9496075986     1.708828054    0.70547459
## 309    2.078796176 -1.0094026560     1.714332073    0.70878962
## 310    2.091018902 -0.9576387819     1.720062255    0.66424736
## 311    2.102632340 -0.9068518972     1.726014332    0.49453561
```

```
## 312    2.114497816 -0.9730719011     1.731677085    0.49563156
##     CumProducedWater    WellCount DomesticFlightsDFW
## 1        -0.80645988 -1.071509482       -0.526757055
## 2        -0.80591104 -1.073003891       -0.737375495
## 3        -0.80534872 -1.067960262       -0.724211842
## 4        -0.80485239 -1.066465854       -0.263484006
## 5        -0.80440616 -1.064597843       -0.869012020
## 6        -0.80398608 -1.064037440       -0.145011133
## 7        -0.80356416 -1.066279052       -0.342465920
## 8        -0.80315845 -1.057873004       -0.447775140
## 9        -0.80272960 -1.060675020        0.460516881
## 10       -0.80230994 -1.061048623       -0.066029218
## 11       -0.80191841 -1.056752198       -0.237156701
## 12       -0.80151525 -1.059927816        0.592153406
## 13       -0.80107771 -1.059927816        0.236734789
## 14       -0.80069645 -1.063103434        0.118261916
## 15       -0.80027001 -1.064224241        0.184080179
## 16       -0.79978637 -1.061609026        0.460516881
## 17       -0.79928726 -1.062916633       -0.368793225
## 18       -0.79881469 -1.061795827        0.170916526
## 19       -0.79835890 -1.063477036       -0.066029218
## 20       -0.79790512 -1.061048623       -0.237156701
## 21       -0.79751468 -1.061609026        0.473680533
## 22       -0.79711919 -1.064411042       -0.145011133
## 23       -0.79673622 -1.061235424       -0.605738970
## 24       -0.79636090 -1.061609026        0.236734789
## 25       -0.79593905 -1.060861822       -0.092356523
## 26       -0.79556229 -1.064037440        0.249898441
## 27       -0.79513900 -1.058993811       -0.355629573
## 28       -0.79469821 -1.064971445       -0.263484006
## 29       -0.79426072 -1.062169429       -0.882175672
## 30       -0.79385096 -1.060114617       -0.368793225
## 31       -0.79343453 -1.062543031       -0.934830282
## 32       -0.79300006 -1.072630289       -0.987484892
## 33       -0.79257891 -1.065718649       -0.658393580
## 34       -0.79219653 -1.072630289       -0.790030105
## 35       -0.79176317 -1.066465854       -1.198103332
## 36       -0.79132500 -1.077673918       -0.618902622
## 37       -0.79089491 -1.066092251       -0.763702800
## 38       -0.79048737 -1.064411042       -0.974321239
## 39       -0.79006885 -1.060301418       -1.395558119
## 40       -0.78955012 -1.060301418       -0.776866452
## 41       -0.78902671 -1.055070988       -1.171776027
## 42       -0.78852494 -1.057686203       -0.513593403
## 43       -0.78799937 -1.060114617       -1.198103332
## 44       -0.78747368 -1.057873004       -1.092794112
## 45       -0.78697189 -1.056565397       -0.539920708
## 46       -0.78643412 -1.055444591       -0.737375495
## 47       -0.78590808 -1.056752198       -1.369230814
## 48       -0.78537305 -1.052829376       -0.592575317
## 49       -0.78484015 -1.056004994       -0.566248013
## 50       -0.78435534 -1.061422225       -0.882175672
## 51       -0.78384669 -1.056938999       -1.237594289
## 52       -0.78337741 -1.060488219       -0.711048190
```

```
## 53       -0.78289715 -1.064037440       -1.250757941
## 54       -0.78246017 -1.060114617       -0.750539147
## 55       -0.78199277 -1.064224241       -1.277085246
## 56       -0.78152763 -1.066092251       -1.553521948
## 57       -0.78102389 -1.062356230       -0.684720885
## 58       -0.78048223 -1.066092251       -1.105957764
## 59       -0.77996357 -1.056752198       -1.461376381
## 60       -0.77942668 -1.059741015       -0.513593403
## 61       -0.77885514 -1.061609026       -1.026975849
## 62       -0.77832712 -1.060675020       -1.290248899
## 63       -0.77776856 -1.056565397       -1.500867339
## 64       -0.77723408 -1.056565397       -0.790030105
## 65       -0.77667544 -1.057312601       -1.198103332
## 66       -0.77611346 -1.058059805       -0.961157587
## 67       -0.77556849 -1.056004994       -1.263921594
## 68       -0.77504417 -1.057125800       -1.171776027
## 69       -0.77454318 -1.061982628       -0.763702800
## 70       -0.77403375 -1.056191795       -0.632066275
## 71       -0.77353436 -1.055631392       -1.171776027
## 72       -0.77307056 -1.058246607       -0.263484006
## 73       -0.77260189 -1.061982628        0.289389399
## 74       -0.77217521 -1.061048623       -0.223993048
## 75       -0.77170142 -1.059741015       -0.447775140
## 76       -0.77122848 -1.059741015       -0.460938793
## 77       -0.77070747 -1.062729832       -0.223993048
## 78       -0.77020681 -1.062729832        0.249898441
## 79       -0.76966974 -1.061235424       -0.421447835
## 80       -0.76921153 -1.060675020       -1.040139502
## 81       -0.76871672 -1.057499402       -0.302974963
## 82       -0.76818390 -1.053763381       -0.645229927
## 83       -0.76766070 -1.052829376       -0.882175672
## 84       -0.76711432 -1.051334967       -0.395120530
## 85       -0.76654936 -1.049093354       -0.447775140
## 86       -0.76598556 -1.041434511       -0.605738970
## 87       -0.76535568 -1.042368516       -0.697884537
## 88       -0.76470966 -1.038445693       -0.381956878
## 89       -0.76408181 -1.039566500       -0.342465920
## 90       -0.76346389 -1.036951285       -0.066029218
## 91       -0.76281968 -1.033402065       -0.539920708
## 92       -0.76222466 -1.028171635       -0.526757055
## 93       -0.76165816 -1.023688409        0.105098264
## 94       -0.76099653 -1.018457979       -0.092356523
## 95       -0.76036876 -1.019578786       -0.210829396
## 96       -0.75967346 -1.021073194        0.447353228
## 97       -0.75899345 -1.015655963        0.868590108
## 98       -0.75835857 -1.014348356        0.671135320
## 99       -0.75761962 -1.016029565        0.026116349
## 100      -0.75689983 -1.004447899       -0.316138615
## 101      -0.75613402 -0.995668249       -0.105520176
## 102      -0.75541426 -0.990811421        0.697462625
## 103      -0.75472039 -0.981844970        0.170916526
## 104      -0.75399300 -0.970450105        0.026116349
## 105      -0.75326320 -0.962604460        0.605317058
## 106      -0.75250856 -0.953264407       -0.539920708
```

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## 107      -0.75180417 -0.954572014       -0.381956878
## 108      -0.75102950 -0.945979165        0.421025923
## 109      -0.75024349 -0.924123440       -0.039701913
## 110      -0.74952635 -0.919079811       -0.131847481
## 111      -0.74869812 -0.906003737       -0.329302268
## 112      -0.74783842 -0.891433253        0.026116349
## 113      -0.74691121 -0.877049571       -0.316138615
## 114      -0.74598904 -0.867709518        0.631644363
## 115      -0.74498895 -0.859677072        0.407862271
## 116      -0.74397984 -0.849963417        0.184080179
## 117      -0.74293579 -0.832217315        0.289389399
## 118      -0.74188271 -0.827547288        2.092809788
## 119      -0.74090954 -0.818394036        1.066044895
## 120      -0.73998797 -0.811855999        2.790483369
## 121      -0.73902800 -0.799900731        1.921682306
## 122      -0.73816105 -0.795977908        2.158628050
## 123      -0.73719021 -0.779165812        1.566263689
## 124      -0.73624897 -0.767023743        2.724665107
## 125      -0.73529972 -0.751706055        1.803209434
## 126      -0.73431748 -0.737509174        2.461392057
## 127      -0.73330178 -0.723872696        1.750554824
## 128      -0.73213066 -0.707434202        2.145464398
## 129      -0.73094562 -0.688940897        2.171791703
## 130      -0.72969474 -0.675678021        2.132300746
## 131      -0.72845813 -0.679040440        1.803209434
## 132      -0.72718403 -0.652701489        2.658846845
## 133      -0.72588554 -0.639065012        2.764156064
## 134      -0.72466878 -0.628417351        2.053318831
## 135      -0.72324842 -0.611044851        1.684736561
## 136      -0.72141979 -0.595540363        2.263937270
## 137      -0.71967423 -0.584892702        1.934845958
## 138      -0.71801843 -0.570882622        2.435064753
## 139      -0.71606890 -0.566212595        2.277100923
## 140      -0.71416610 -0.548279693        2.105973441
## 141      -0.71216638 -0.539313242        2.974774504
## 142      -0.71010588 -0.526237167        2.303428228
## 143      -0.70808962 -0.517083915        2.000664221
## 144      -0.70598149 -0.505502248        2.198119008
## 145      -0.70382250 -0.490371362        1.579427341
## 146      -0.70184686 -0.479163298        0.131425569
## 147      -0.69913534 -0.464592815       -0.500429750
## 148      -0.69639276 -0.454318756       -0.145011133
## 149      -0.69347635 -0.439001068       -0.329302268
## 150      -0.69055056 -0.436012251        0.131425569
## 151      -0.68726669 -0.411541312        0.065607306
## 152      -0.68330076 -0.396223624        0.249898441
## 153      -0.67917570 -0.380905937        0.447353228
## 154      -0.67490332 -0.369697873        0.315716704
## 155      -0.67018776 -0.355874594       -0.395120530
## 156      -0.66419755 -0.345787336        0.710626278
## 157      -0.65855206 -0.327667632        0.197243831
## 158      -0.65382843 -0.304317499       -0.289811310
## 159      -0.64806562 -0.287131801        0.026116349
## 160      -0.64171720 -0.268825296       -0.039701913
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## 161      -0.63525920 -0.267891291       -0.000210956
## 162      -0.62933983 -0.226981857        0.342044008
## 163      -0.62226706 -0.213345379        0.039280001
## 164      -0.61547324 -0.192610461        0.026116349
## 165      -0.60830826 -0.176171967        0.197243831
## 166      -0.60122539 -0.148338608        0.065607306
## 167      -0.59506775 -0.133207721       -0.421447835
## 168      -0.58860268 -0.105187561        0.960735675
## 169      -0.58190021 -0.092858691       -0.263484006
## 170      -0.57570079 -0.062970520       -0.237156701
## 171      -0.56772740 -0.022247887       -0.105520176
## 172      -0.55705415 -0.005062189       -0.092356523
## 173      -0.54536434  0.040704072       -0.302974963
## 174      -0.53474813  0.070405442        0.328880356
## 175      -0.52404924  0.097865199       -0.237156701
## 176      -0.51448096  0.138401031        0.394698618
## 177      -0.50423450  0.171278018        0.170916526
## 178      -0.49069680  0.211627049       -0.671557232
## 179      -0.47785795  0.231614763       -0.539920708
## 180      -0.46516028  0.279622637        0.065607306
## 181      -0.45164215  0.311378819       -0.908502977
## 182      -0.43593881  0.353782661       -0.855848367
## 183      -0.42118336  0.379000805       -0.947993934
## 184      -0.40800182  0.401977336       -0.737375495
## 185      -0.39348256  0.466610506       -1.369230814
## 186      -0.37133509  0.489213435       -1.132285069
## 187      -0.33539746  0.532551282       -1.579849253
## 188      -0.30461050  0.572900313       -1.395558119
## 189      -0.27593395  0.618292972       -1.474540034
## 190      -0.25154737  0.656587191       -1.658831168
## 191      -0.23067053  0.676014502       -1.066466807
## 192      -0.21075664  0.700111840       -0.618902622
## 193      -0.18244741  0.729626408       -1.303412551
## 194      -0.15616446  0.769601837       -1.408721771
## 195      -0.12856142  0.800797615       -1.593012906
## 196      -0.10113748  0.809577265       -1.527194643
## 197      -0.07357252  0.819664523       -1.566685601
## 198      -0.04592818  0.833114200       -0.776866452
## 199      -0.01752137  0.830685786       -1.290248899
## 200       0.01281364  0.842454253       -1.000648544
## 201       0.04478898  0.832366995       -1.211266984
## 202       0.09481796  0.834982210       -1.184939679
## 203       0.13153262  0.845816672       -1.395558119
## 204       0.16542729  0.871595220       -0.381956878
## 205       0.19126858  0.869166806       -1.079630459
## 206       0.21427550  0.899241778       -1.145448722
## 207       0.23938464  0.922591911       -1.527194643
## 208       0.26239153  0.874770838       -1.132285069
## 209       0.28163547  0.956776506       -1.329739856
## 210       0.29886906  0.976764221       -0.803193757
## 211       0.31737124  1.001608762       -0.934830282
## 212       0.33517351  1.018981262       -0.855848367
## 213       0.35256199  1.046254218       -0.658393580
## 214       0.37345027  1.064187120       -1.040139502
```

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## 215       0.39764842  1.069791152       -0.711048190
## 216       0.42716879  1.099492522       -0.171338438
## 217       0.45569134  1.102668140       -0.790030105
## 218       0.47579290  1.094075291       -0.237156701
## 219       0.50286198  1.129754295       -0.908502977
## 220       0.52904829  1.153291229       -0.869012020
## 221       0.55530906  1.173278943       -0.368793225
## 222       0.57931378  1.192332652       -0.592575317
## 223       0.60236010  1.199804695       -0.790030105
## 224       0.62357298  1.222407624       -0.421447835
## 225       0.64508083  1.239219720       -0.395120530
## 226       0.66883591  1.262009450       -0.776866452
## 227       0.69345199  1.268547488       -0.118683828
## 228       0.71745479  1.266492676        0.447353228
## 229       0.74051423  1.284985982       -0.513593403
## 230       0.76232232  1.280129154       -0.908502977
## 231       0.78589959  1.292831626       -1.092794112
## 232       0.81014490  1.305534099       -1.145448722
## 233       0.83486371  1.300677271       -0.961157587
## 234       0.85827597  1.312445738       -0.803193757
## 235       0.88045552  1.327389824       -0.737375495
## 236       0.90031030  1.326642620       -0.737375495
## 237       0.91927651  1.322346195       -0.355629573
## 238       0.93848827  1.331686248       -0.632066275
## 239       0.95733743  1.314313749       -0.592575317
## 240       0.97660387  1.333741060       -0.026538261
## 241       0.99535464  1.339531893       -0.395120530
## 242       1.01342368  1.335048668       -0.355629573
## 243       1.03389871  1.347190737       -0.368793225
## 244       1.05247425  1.354475979        0.052443654
## 245       1.06978360  1.348498344        0.170916526
## 246       1.08678794  1.362882027        0.289389399
## 247       1.10506540  1.358959204        0.052443654
## 248       1.12216021  1.360640414        0.684298973
## 249       1.13855878  1.362882027        0.184080179
## 250       1.15596655  1.373342886       -0.145011133
## 251       1.17332923  1.363068828        0.302553051
## 252       1.18948521  1.342707511        0.802771845
## 253       1.20713919  1.349432350        0.184080179
## 254       1.22195779  1.329444636       -0.158174786
## 255       1.23853634  1.348871947       -0.184502091
## 256       1.25636468  1.352981570       -0.368793225
## 257       1.27620973  1.358772403        0.460516881
## 258       1.29570106  1.356343989        0.223571136
## 259       1.31531946  1.346069931        0.105098264
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## 261       1.34758264  1.361014016        0.486844186
## 262       1.36448146  1.360453613        0.210407484
## 263       1.38304835  1.353168371        0.736953583
## 264       1.40323319  1.354102376        1.645245604
## 265       1.42083679  1.343641517        1.197681420
## 266       1.43848345  1.329818238        0.605317058
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## 268       1.47791319  1.302545282        0.789608193
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## 269       1.49760678  1.277513939        1.092372200
## 270       1.51699380  1.274525122        1.184517767
## 271       1.53689220  1.249493779        1.039717590
## 272       1.55616122  1.247999370        0.842262803
## 273       1.57375640  1.242582139        0.789608193
## 274       1.59050058  1.244636951        0.763280888
## 275       1.60620867  1.225396441        0.618480711
## 276       1.62194978  1.202980313        1.750554824
## 277       1.63804425  1.205408727        0.710626278
## 278       1.65220018  1.176454561       -0.237156701
## 279       1.66759162  1.168795718        0.197243831
## 280       1.68199054  1.173278943        0.526335143
## 281       1.69564335  1.165059696        0.565826101
## 282       1.70875359  1.172344938        1.026553937
## 283       1.72227058  1.163565288        0.631644363
## 284       1.73584065  1.160016068        1.250336029
## 285       1.75061018  1.159455664        0.855426455
## 286       1.76713286  1.153851632        0.829099150
## 287       1.78236038  1.150489213        1.421463512
## 288       1.79787185  1.141335961        1.974336916
## 289       1.81428988  1.138907547        0.973899327
## 290       1.82945140  1.129941096        0.118261916
## 291       1.84649124  1.138533945        0.157752874
## 292       1.86379664  1.138907547        0.921244718
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## 294       1.89899837  1.143203971        1.013390285
## 295       1.91682437  1.147873998        0.618480711
## 296       1.93610183  1.137039536        0.908081065
## 297       1.95351262  1.140401955        0.592153406
## 298       1.97292366  1.136665934        0.421025923
## 299       1.99044253  1.121908650        0.671135320
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## 301       2.02547148  1.120601042        0.618480711
## 302       2.04244515  1.108832575        0.144589221
## 303       2.06054248  1.108458973        0.026116349
## 304       2.07795669  1.112381795        0.789608193
## 305       2.09615706  1.103788946        0.355207661
## 306       2.11405991  1.092394081        1.158190462
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## 308       2.14816184  1.073153571        1.066044895
## 309       2.16492828  1.067175937        0.368371313
## 310       2.18124886  1.050363841        2.895792589
## 311       2.19587065  0.964435350        1.592590994
## 312       2.21050342  0.875891644       -1.237594289
##     InternationalFlightsDFW TotalFlightsDFW Precipitation  Evaporation
## 1              -1.581523359   -0.9655434256 -0.4114226546 -1.505446260
## 2              -1.787564957   -1.2123405535  0.6848648897 -1.414897840
## 3              -1.478502559   -1.1001600408 -0.0162623657 -0.817278266
## 4              -1.444162293   -0.6963101951  0.3992204523 -0.255878061
## 5              -1.306801227   -1.1674683484  0.0503503687 -0.024332815
## 6              -1.272460961   -0.5392574773  0.2513176013  0.719457780
## 7              -1.238120695   -0.6963101951 -1.4241620236  2.980581188
## 8              -1.272460961   -0.7972726565 -0.8619053840  2.489032621
## 9              -1.753224691   -0.1802798367  0.5188975684  1.226528933
```

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## 10           -1.924926023   -0.6850921438  2.0487324011 -0.047616694
## 11           -1.581523359   -0.7187462976 -0.5367449177 -0.923349273
## 12           -1.341141494    0.0665172912 -0.2307779511 -1.236388097
## 13           -1.444162293   -0.2700242469 -0.7919055614 -1.476988185
## 14           -1.547183092   -0.4046408621 -0.2680359212 -1.448530110
## 15           -1.409822027   -0.3036784007 -0.3402938026 -0.475781367
## 16           -1.478502559   -0.0905354266  0.0887373682 -0.019158620
## 17           -0.310933502   -0.4158589134  1.3013149404 -0.456378134
## 18            0.066809429    0.1674797526 -0.5164223885  0.866922350
## 19           -0.242252969   -0.1354076317  0.8643805638  1.212299896
## 20           -0.929058297   -0.5056033235 -0.3888420667  1.142448257
## 21           -1.032079096    0.0665172912  0.3811559820  0.090793034
## 22           -1.444162293   -0.5953477337  1.9132488735 -0.414984571
## 23           -1.581523359   -1.0328517332  1.4390565268 -1.081162234
## 24           -1.203780428   -0.1914978880  0.0322858983 -1.632214049
## 25           -0.963398563   -0.3934228108 -0.4712612127 -1.324349420
## 26           -1.375481760   -0.2363700931 -0.2917455386 -1.118675151
## 27           -0.997738830   -0.6290018875  0.7368002420 -1.051410610
## 28           -1.169440162   -0.6065657850  0.8948643575 -0.271400647
## 29           -0.619995899   -0.9543253743  2.0961516358 -0.298565173
## 30           -0.070551637   -0.3373325545  0.0887373682  0.565525465
## 31           -0.551315367   -0.9767614768  0.0356729865  1.192896663
## 32           -0.723016699   -1.0777239383  0.0243826926  1.223941835
## 33           -0.757356965   -0.8084907078  0.3021239242  0.132186597
## 34           -1.203780428   -1.0665058870 -1.1306143804  0.565525465
## 35           -1.135099895   -1.3918293738 -1.0210985289 -0.571503983
## 36           -1.306801227   -0.9543253743 -0.4633580069 -1.206636473
## 37           -1.306801227   -1.0777239383 -0.8754537367 -0.947926701
## 38           -1.100759629   -1.1899044509 -1.3033558781 -0.175678032
## 39           -0.654336166   -1.4030474251 -0.4870676242 -0.147219957
## 40           -1.032079096   -0.9991975794 -0.1720684225  0.575873856
## 41           -0.379614035   -1.1225961433 -0.9093246186  0.891499778
## 42           -0.482634834   -0.5953477337 -0.2567456273  1.089412754
## 43           -0.791697231   -1.2796488611  0.1497049556  1.555090344
## 44           -1.100759629   -1.2908669124  1.3024439698  0.388309272
## 45           -1.306801227   -0.8870170667  0.4059946287 -0.254584512
## 46           -1.924926023   -1.2572127586  0.1530920438  0.160644672
## 47           -1.581523359   -1.6834987068  2.6019568056 -0.781058898
## 48           -1.100759629   -0.8645809641  0.1248663089 -0.746133079
## 49           -1.547183092   -0.9879795281 -1.0515823226 -1.065639648
## 50           -1.238120695   -1.1562502971  1.8297006981 -1.290717149
## 51           -0.551315367   -1.2347766560 -0.1596490991 -0.522349126
## 52           -0.654336166   -0.8197087591  1.3848631158 -0.174384483
## 53           -0.345273768   -1.1786863997  0.2693820717 -0.039855401
## 54            0.204170494   -0.5729116312  0.3427689825  0.583635149
## 55            0.169830228   -1.0328517332 -0.7117444742  1.438670946
## 56           -0.104891903   -1.3581752200  0.0763180448  1.222648287
## 57           -1.100759629   -0.9431073230 -1.0425500875  0.934186891
## 58           -1.032079096   -1.2796488611  0.9829286505 -0.149807054
## 59           -1.203780428   -1.6386265017 -0.5491642410 -0.941458957
## 60            0.101149695   -0.4046408621  1.2448634705 -1.091510625
## 61           -0.207912703   -0.9431073230  0.8000258882 -1.546839824
## 62           -0.413954301   -1.2347766560 -0.1020685999 -1.378678472
## 63            0.101149695   -1.2459947073  0.5109943626 -0.413691022
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## 64            -0.001871104   -0.6738740926 -0.8212603257  0.340447964
## 65             0.444552359   -0.8757990154 -0.8156151787  0.676770667
## 66             0.307191293   -0.7187462976 -0.6541639750  2.027235678
## 67            -0.276593235   -1.1674683484 -1.2480334377  2.648139131
## 68            -0.207912703   -1.0665058870 -0.7444863267  1.657280704
## 69            -0.585655633   -0.8421448616 -0.2014231868  0.755677148
## 70            -1.066419363   -0.8870170667  0.9829286505 -0.130403822
## 71            -0.826037498   -1.2684308098  0.5900264204 -1.072107392
## 72            -0.551315367   -0.4046408621  0.5256717448 -1.559775312
## 73            -0.448294567    0.1001714450 -0.3120680677 -1.400668803
## 74            -0.791697231   -0.4495130672 -1.2920655842 -1.189820338
## 75            -0.413954301   -0.5168213748  0.1090598973 -0.396874887
## 76            -0.654336166   -0.6065657850 -0.2443263039 -0.012690875
## 77            -0.001871104   -0.1914978880  1.2143796768  0.079151094
## 78             0.375871826    0.3357505216 -0.2657778624  0.982048199
## 79             0.135489961   -0.3148964520 -1.0865822339  1.665041997
## 80             0.204170494   -0.8197087591 -1.2875494666  1.446432239
## 81            -0.139232170   -0.3036784007 -0.6225511518  0.538360939
## 82            -0.757356965   -0.7972726565 -0.3572292436 -0.035974755
## 83            -0.963398563   -1.0665058870 -1.1881948797 -0.844442792
## 84            -0.070551637   -0.3597686570 -0.0636816004 -1.288130052
## 85            -0.448294567   -0.5280394261 -0.6270672694 -0.625833035
## 86            -0.448294567   -0.6626560413 -0.6383575634 -0.598668509
## 87            -0.345273768   -0.7075282464 -0.0817460708 -0.392994240
## 88            -0.413954301   -0.4607311185 -0.0501332476 -0.465432976
## 89             0.169830228   -0.2363700931  0.3348657767  0.190396296
## 90             0.890975822    0.2347880602  2.0476033717  0.214973724
## 91             0.341531560   -0.3485506058 -1.2265818792  1.618474238
## 92             0.341531560   -0.3373325545 -1.4365813470  2.049226008
## 93            -0.345273768   -0.0232271190 -1.0199694995  1.001451431
## 94            -0.379614035   -0.2027159393  0.7785743296  0.127012402
## 95            -0.104891903   -0.2139339905  1.6614753180 -1.092804174
## 96            -0.036211371    0.3694046754  0.2727691599 -0.966036385
## 97            -0.242252969    0.6610740084 -0.0422300419 -1.275194563
## 98            -0.242252969    0.4928032394  1.4740564381 -1.333404262
## 99            -0.516975100   -0.1466256829  0.6385746844 -0.984146069
## 100           -0.585655633   -0.4607311185 -0.8020668259 -0.241649024
## 101            0.066809429   -0.0680993240  0.3258335415  0.212386627
## 102            0.375871826    0.7171642648 -0.5119062710  1.070009521
## 103            0.066809429    0.1674797526 -1.0414210581  2.067335692
## 104           -0.070551637   -0.0007910164  0.0526084275  1.518870976
## 105           -0.139232170    0.4703671369  0.3111561594  0.017060749
## 106           -0.688676432   -0.6850921438 -0.1641652167 -0.037268304
## 107           -0.619995899   -0.5280394261 -0.5254546237 -0.729316944
## 108           -0.757356965    0.1113894963  0.4105107463 -1.174297752
## 109           -0.929058297   -0.3373325545 -0.3098100089 -1.158775166
## 110           -1.135099895   -0.4831672210 -0.6835187393 -0.967329934
## 111           -0.482634834   -0.4382950159  1.1455088836 -0.562449141
## 112           -0.723016699   -0.2139339905  0.2829304244 -0.165329641
## 113           -0.413954301   -0.4046408621  0.6126070083  0.023528493
## 114            0.307191293    0.6386379059 -0.2240037748  0.784135223
## 115           -0.585655633    0.1562617013  0.2456724543  0.816473944
## 116           -0.585655633   -0.0344451702 -0.6778735923  1.317077353
## 117           -0.929058297   -0.0568812728 -0.6157769755  0.608212578
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## 118           -0.791697231    1.5248639561  1.6050238481 -0.704739516
## 119           -1.066419363    0.5601115470 -1.0606145578 -0.795287936
## 120           -0.654336166    2.1642928785  0.6442198314 -1.131610640
## 121           -0.723016699    1.4014653922 -1.3112590839 -1.332110713
## 122           -0.791697231    1.5809542125  0.1418017498 -1.416191389
## 123           -0.894718031    1.0424877516 -0.9070665598 -0.669813696
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## 125           -0.482634834    1.3790292896  0.2422853661  0.002831711
## 126           -0.242252969    2.0184582120  0.7040583895  0.534480293
## 127           -0.585655633    1.3005029308 -1.0899693221  1.546035502
## 128           -0.723016699    1.5921722638 -0.3380357438  1.257574106
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## 130           -0.619995899    1.6146083663 -0.7715830322 -0.201549009
## 131           -0.826037498    1.2668487770 -0.2962616562 -0.574091081
## 132           -0.860377764    1.9848040582 -0.9646470591 -0.800462131
## 133           -0.826037498    2.0857665196 -0.2657778624 -1.297184894
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## 137           -0.276593235    1.5585181100 -0.2522295097  0.089499485
## 138            0.238510761    2.1530748272  3.0761491522  0.236964055
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## 145           -0.173572436    1.2892848795  0.3292206297 -1.319175224
## 146            0.101149695    0.1450436501 -0.4825515066 -1.246736488
## 147            0.066809429   -0.4046408621 -0.5469061823 -0.433094255
## 148           -0.001871104   -0.1241895804 -0.9838405588  0.117957560
## 149            0.410212093   -0.1466256829 -0.2104554220 -0.096771551
## 150            0.787955023    0.3694046754 -0.7760991498  1.093293401
## 151            0.581913425    0.2460061115 -0.1765845401  1.057074032
## 152            0.513232892    0.3806227267 -0.2070683338  1.020854664
## 153           -0.173572436    0.3245324704 -0.9522277357  1.086825656
## 154            0.444552359    0.4142768805 -1.0888402927  0.229202762
## 155           -0.207912703   -0.4046408621 -1.0786790282 -0.170503836
## 156            0.238510761    0.6835101110 -1.2920655842 -0.845736341
## 157            0.169830228    0.2235700089 -0.3448099202 -0.270107098
## 158            0.547573158   -0.0680993240 -0.2522295097 -0.936284762
## 159            0.856635556    0.3020963678  0.7876065648  0.116664011
## 160            0.753614757    0.2123519577 -0.0828751001  0.412886700
## 161            0.993996621    0.3245324704 -0.4825515066  0.586222247
## 162            0.753614757    0.5376754445 -0.7444863267  1.424441909
## 163            1.268718752    0.4479310343 -1.0752919400  2.009125994
## 164            1.028336888    0.3581866242 -0.5152933591  2.214800263
## 165            0.341531560    0.2796602653 -0.2431972745  0.667715825
## 166           -0.379614035   -0.0680993240  0.2987368360  0.141241439
## 167           -0.207912703   -0.4270769647 -0.2115844514 -0.755187921
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## 169           -0.001871104   -0.2251520418  0.4613170691 -1.288130052
## 170            0.478892625   -0.0456632215 -1.1125499101 -0.888423454
## 171            0.478892625    0.0665172912  1.4740564381 -0.377471654
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## 172            0.719274490    0.1562617013 -0.2115844514 -0.308913564
## 173            0.925316089    0.0440811886  2.4382475430 -0.374884556
## 174            1.234378486    0.6835101110  3.4758255587  0.350796355
## 175            0.753614757    0.0440811886  0.6803487721  0.270596325
## 176            0.959656355    0.6498559572 -0.5706157996  0.949709477
## 177           -0.036211371    0.1338255988  0.1711565141  0.010593004
## 178           -0.448294567   -0.7187462976 -0.2567456273 -0.019158620
## 179           -0.413954301   -0.5953477337 -0.7806152674 -0.541752359
## 180           -0.139232170    0.0104270348 -0.4181968310 -1.219571962
## 181           -0.036211371   -0.7860546053 -1.1746465269 -1.091510625
## 182            0.238510761   -0.6514379900 -0.4588418893 -0.885836356
## 183            0.101149695   -0.7748365540  1.7472815521 -0.142045761
## 184            0.341531560   -0.5168213748  0.6238973023  0.123131755
## 185            0.444552359   -1.0216336819  0.0492213393  0.256367288
## 186            0.135489961   -0.9206712205 -0.4125516840  1.482651608
## 187            0.375871826   -1.2235586048 -0.9781954118  1.891413047
## 188           -0.036211371   -1.2011225022  0.5053492156  1.001451431
## 189           -0.585655633   -1.4479196301 -0.5107772416  0.205918882
## 190           -0.894718031   -1.7059348093 -0.7738410910  0.132186597
## 191           -0.688676432   -1.1338141946 -0.4610999481 -0.325729699
## 192           -0.551315367   -0.7075282464 -1.1317434098 -0.861258928
## 193           -0.310933502   -1.2123405535 -0.9567438533 -1.079868685
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## 197           -0.826037498   -1.6049723479  0.8519612404 -0.250703866
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## 204           -0.757356965   -0.5729116312 -0.3786808021 -1.284249405
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## 207           -0.379614035   -1.4254835276  0.2490595425 -0.349013579
## 208           -0.379614035   -1.0889419895 -0.1799716283  0.053280117
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## 219           -0.482634834   -0.9318892718 -1.3451299658 -0.054084439
## 220           -0.036211371   -0.7524004515 -0.1822296871  0.822941689
## 221           -0.207912703   -0.3822047596  0.7368002420  0.460748008
## 222            0.204170494   -0.4382950159 -0.7681959440  1.816387214
## 223            0.169830228   -0.6177838362 -1.4128717296  2.315697074
## 224            0.238510761   -0.2812422982 -1.1362595274  2.741274649
## 225           -0.036211371   -0.3485506058 -0.9443245299  1.477477412
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## 226           -0.001871104   -0.6626560413  0.3585753940  0.403831858
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## 228           -0.070551637    0.3581866242  0.3924462759 -1.143252579
## 229           -0.207912703   -0.5056033235  1.0924445020 -1.068226745
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## 245            0.547573158    0.3245324704  0.4692202749  0.124425304
## 246            1.131357687    0.6162018034 -0.1799716283  1.300261218
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## 248            1.097017421    0.9415252902 -1.1046467043  1.903054987
## 249            0.066809429    0.1786978039  0.0085762810  0.941948184
## 250            0.238510761   -0.0456632215  0.5211556272 -0.480955563
## 251            0.650593957    0.4703671369 -0.2556165979 -0.844442792
## 252            0.719274490    0.9190891876 -0.1799716283 -1.461465599
## 253            0.616253691    0.3581866242 -1.2457753789 -1.298478443
## 254            0.444552359    0.0104270348 -1.1249692334 -1.116088053
## 255            0.616253691    0.0440811886 -0.7885184732 -0.711207260
## 256            0.719274490   -0.0793173753 -0.3346486556  0.661248081
## 257            1.577781150    0.9078711364  0.3563173352  0.584928698
## 258            2.127225412    0.8854350338  0.7243809186  0.905728816
## 259            1.749482482    0.6610740084  0.3664785998  1.168319234
## 260            1.543440884    0.8854350338 -0.6880348569  1.487825803
## 261            0.787955023    0.6722920597 -0.8596473252  0.593983540
## 262            0.547573158    0.3581866242  0.0006730752  0.321044731
## 263            1.131357687    0.9976155465 -0.3402938026 -0.574091081
## 264            1.131357687    1.7716610841 -0.7749701204 -1.339872006
## 265            1.303059019    1.4463375973  0.0537374569 -1.152307421
## 266            1.165697953    0.8966530851 -0.1370685112 -1.010017047
## 267            1.680801949    1.4687736998  0.2648659541 -0.817278266
## 268            1.715142216    1.2331946232  1.7597008755  0.239551153
## 269            1.955524080    1.5697361612  5.6909812353  0.244725348
## 270            1.921183814    1.6370444688  1.0980896490  1.293793474
## 271            2.298926744    1.6370444688 -0.8359377078  1.692206523
## 272            2.333267011    1.4799917511 -1.0527113520  1.716783951
## 273            1.268718752    1.0873599567 -0.9364213242  0.983341747
## 274            0.822295289    0.9190891876  3.0558266231  0.606919029
## 275            0.959656355    0.8405628287  2.8751819196 -0.548220103
## 276            1.440420084    1.9623679556  0.8835740636 -0.814691169
## 277            1.337399285    1.0424877516 -1.0504532932 -1.286836503
## 278            1.337399285    0.2347880602 -0.5638416232 -0.669813696
## 279            1.303059019    0.5937657008  0.5708329206 -0.308913564
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## 280            1.612121416    0.9751794440  1.5474433489 -0.140752212
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## 282            1.715142216    1.4351195460  0.6645423606  0.843638470
## 283            1.680801949    1.0873599567 -0.4904547124  1.918577574
## 284            1.680801949    1.6146083663  0.4387364812  0.015767200
## 285            0.959656355    1.0424877516 -0.3188422441  0.172286612
## 286            1.028336888    1.0424877516 -0.6180350343  0.042931726
## 287            1.371739552    1.6594805714  0.0401891041 -0.631007231
## 288            1.234378486    2.0857665196 -1.0741629106 -1.147133226
## 289            1.165697953    1.2107585206 -0.0557783946 -0.976384776
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## 293            1.543440884    0.8854350338 -0.5401320059  0.075270447
## 294            1.783822748    1.4463375973  1.2437344411  0.578460954
## 295            1.921183814    1.1546682643  0.3122851887  1.727132342
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## 297            1.131357687    0.8742169825 -0.8878730601  0.454280263
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## 300            1.303059019    2.1979470323 -0.0422300419 -1.039768670
## 301            1.131357687    0.8966530851 -1.1690013799 -1.530023689
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## 307            1.406079818    0.9863974952 -0.7772281792  1.373993503
## 308            1.406079818    1.3678112384  0.4082526875  1.249812813
## 309            0.581913425    0.5040212907  3.0174396236 -0.751307275
## 310            5.217849388    4.1723240556  3.4645352647 -0.887129905
## 311            2.882711273    2.2989094937 -0.3561002142 -1.209223571
## 312            4.840106458    0.5264573932  0.7842194766 -1.350220397
##     NetEvaporation GroundwaterLvlDiff ReservoirStorage ConservationStorage
## 1     -0.630948514        -0.17141001     9.876460e-02         0.075707812
## 2     -1.342081359        -0.26413843     3.113349e-01         0.096926761
## 3     -0.487301257        -0.39778926     5.346544e-01         0.097131736
## 4     -0.435209395        -0.53231078     1.633530e-01         0.094359790
## 5     -0.050045324        -0.64071162     2.077564e-01         0.093451798
## 6      0.263295120        -0.70296592     1.216523e-01         0.050253174
## 7      2.814217822        -0.70470730    -4.153510e-01        -0.490627261
## 8      2.121238202        -0.57671595    -8.360457e-01        -0.920228417
## 9      0.385632068        -0.56844440    -1.069536e+00        -1.142998964
## 10    -1.461261225        -0.55364268    -8.313215e-01        -0.953889731
## 11    -0.188167686        -0.53448751    -5.053658e-01        -0.616288888
## 12    -0.593063523        -0.50314269    -3.683923e-01        -0.535822493
## 13    -0.347600354        -0.48224614    -5.084534e-01        -0.601316065
## 14    -0.696457977        -0.47049183    -5.335667e-01        -0.580566518
## 15    -0.052413136        -0.57584526    -4.671795e-01        -0.536335070
## 16    -0.073723443        -0.68816420    -5.850126e-01        -0.572627297
## 17    -1.188173584        -0.81136675    -1.868900e-01        -0.509740489
## 18     0.889976006        -0.90931932    -4.884473e-01        -0.542946507
## 19     0.135433276        -0.91759087    -2.345533e-01        -0.404164127
## 20     0.968903070        -0.91846156    -3.962822e-01        -0.350288730
```

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## 21    -0.211056534       -0.88711673    -4.295719e-01       -0.385858636
## 22    -1.590701610       -0.89756501    -3.215399e-01       -0.399141290
## 23    -1.665682320       -0.94937103     4.323521e-01       -0.078627191
## 24    -1.018480397       -1.02468567     5.289045e-01        0.094916829
## 25    -0.478619280       -1.13308650     3.203488e-01        0.099856343
## 26    -0.478619280       -1.23756924     1.663959e-01        0.070192586
## 27    -1.156602759       -1.34945283     3.340571e-01        0.099903227
## 28    -0.791170453       -1.46003039     5.371479e-01        0.104304401
## 29    -1.647529096       -1.56233640     7.090275e-01        0.102287176
## 30     0.283026886       -1.64505190     3.997023e-01        0.104567263
## 31     0.702918865       -1.69772861    -2.420731e-02        0.034625683
## 32     0.729754067       -1.67422000    -2.576219e-01       -0.178320240
## 33    -0.130550929       -1.39603472    -5.179374e-01       -0.476056844
## 34     1.135439175       -1.33813387    -7.175565e-01       -0.711519925
## 35     0.365111032       -1.36991403    -9.099572e-01       -0.938468552
## 36    -0.412320547       -1.42650885    -1.026249e+00       -1.075641589
## 37     0.033617364       -1.50225883    -1.068116e+00       -1.125026989
## 38     0.803945507       -1.57365536    -1.159930e+00       -1.233326950
## 39     0.250666789       -1.64548724    -1.269966e+00       -1.363121438
## 40     0.471662568       -1.71818981    -1.291320e+00       -1.388309808
## 41     1.179638331       -1.77870273    -1.370971e+00       -1.482262974
## 42     0.844198309       -1.77347859    -1.514801e+00       -1.651919633
## 43     0.844198309       -1.68684499    -1.735670e+00       -1.912448346
## 44    -0.673569128       -1.54318123    -1.900180e+00       -2.106498557
## 45    -0.439155748       -1.46873729    -1.948293e+00       -2.163250646
## 46    -0.009003251       -1.45175884    -1.283980e+00       -1.379651445
## 47    -2.295520290       -1.47222004    -3.924762e-01       -0.365625400
## 48    -0.542550202       -1.51531917     7.788413e-01        0.961550403
## 49     0.084919955       -1.56799588     7.233454e-01        0.965818115
## 50    -2.066631805       -1.63416828     1.298485e+00        1.150372777
## 51    -0.207110181       -1.69555189     2.005958e+00        1.330173017
## 52    -1.074518612       -1.76956049     1.829306e+00        1.324495259
## 53    -0.212635075       -1.84487513     1.423960e+00        1.331295749
## 54     0.116490781       -1.92106045     1.144224e+00        1.341277580
## 55     1.375377449       -1.97068975     9.841142e-01        1.270537372
## 56     0.692658347       -1.93194407     7.583609e-01        1.023726700
## 57     1.298818197       -1.85140530     4.514018e-01        0.667339205
## 58    -0.778542123       -1.75911222     8.328718e-02        0.233125037
## 59    -0.190535497       -1.71035361    -1.877218e-02        0.112739670
## 60    -1.536241936       -1.71731912     2.653626e-01        0.405809942
## 61    -1.503092569       -1.75693549     1.140045e+00        1.101173831
## 62    -0.769860146       -1.81614238     9.378584e-01        1.119631835
## 63    -0.609638206       -1.88275012     1.212428e+00        1.127231029
## 64     0.781845929       -1.95458200     9.606483e-01        1.102692660
## 65     0.983109942       -2.02423715     7.449667e-01        0.990627623
## 66     1.694242787       -1.68162086     5.055358e-01        0.731193633
## 67     2.488249049       -1.15050029     1.161892e-01        0.271934978
## 68     1.531653035       -0.21668586    -3.116106e-01       -0.232681441
## 69     0.601892223        0.70232685    -5.999870e-01       -0.572839438
## 70    -0.766703063        0.55343896    -3.836419e-01       -0.324565703
## 71    -1.066625906       -0.28198757    -1.734868e-01       -0.092932046
## 72    -1.319192510       -0.54014699     2.607811e-01        0.299306612
## 73    -0.636473408       -0.71515557     2.371614e-01        0.377088269
## 74     0.177264620       -0.86012536     3.030495e-01        0.414574010
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## 75    -0.318397341       -1.00509516     2.413701e-01        0.372248984
## 76     0.163057748       -0.70078919     2.499734e-01        0.395956930
## 77    -0.800641701       -0.78394004     3.096511e-01        0.419708784
## 78     0.785003011       -1.04122877     3.788241e-01        0.512541160
## 79     1.775537662       -0.98376326     1.472919e-01        0.307739534
## 80     1.782641098       -0.09174192    -2.628825e-01       -0.175203624
## 81     0.763692704        0.15379250    -6.444420e-01       -0.625276856
## 82     0.227777941       -0.28155222    -9.539570e-01       -0.990369017
## 83     0.315386982       -0.42434529    -1.148633e+00       -1.220001524
## 84    -0.741446403       -0.57323319    -1.187396e+00       -1.265725356
## 85     0.056506212       -0.79003486    -1.231676e+00       -1.317956234
## 86     0.080973602       -0.88929346    -1.296882e+00       -1.394870399
## 87    -0.182642791       -1.00248309    -1.168865e+00       -1.243865870
## 88    -0.248941525       -1.06038394    -1.095387e+00       -1.157194884
## 89    -0.117922599       -0.66465558    -9.966009e-01       -1.040670231
## 90    -1.300250015       -0.76913831    -5.699294e-01       -0.574404118
## 91     1.844993479       -0.23975913    -4.622813e-01       -0.428009371
## 92     2.254624940        0.75587425    -9.337468e-01       -0.966529904
## 93     1.324074857        1.28133534    -1.368546e+00       -1.479402306
## 94    -0.466780221        0.86775785    -1.745327e+00       -1.923874112
## 95    -1.828272072        0.37755969    -1.180712e+00       -1.268440955
## 96    -0.780120664        0.38800796    -6.481880e-01       -0.676901186
## 97    -0.748549839        0.39976227    -5.628188e-02       -0.056302290
## 98    -1.844057485        0.41412865     6.681039e-01        0.495805951
## 99    -1.046894140        0.42762433     1.721487e+00        1.024059535
## 100    0.413256541        0.43720192     1.130791e+00        1.020846374
## 101   -0.098190833        0.44329674     8.767225e-01        1.006534579
## 102    1.010734414        0.45287433     6.217295e-01        0.853627766
## 103    1.989430005        0.45940450     3.990427e-01        0.599039622
## 104    0.889976006        0.81072769    -2.900754e-02        0.100631100
## 105   -0.207110181        0.38234848    -1.058454e-01        0.009996093
## 106    0.092023391       -0.02252211    -1.152458e-01       -0.003096323
## 107   -0.077669796       -0.01207384    -1.803986e-01       -0.078081230
## 108   -1.003484255        0.39236141     1.735502e-02        0.049699542
## 109   -0.490458340        0.04365029     6.028184e-02        0.175814092
## 110   -0.112397704       -0.12395743     3.902112e-01        0.518152654
## 111   -1.143974428       -0.18534104     6.350300e-01        0.697911257
## 112   -0.298665575       -0.25543154     1.317625e+00        1.013656121
## 113   -0.413899088       -0.25369016     9.495198e-01        1.015032480
## 114    0.635041590       -0.29330653     7.529930e-01        0.950656871
## 115    0.326436771       -0.23018155     6.097303e-01        0.837134499
## 116    1.277507890       -0.04254797     3.031651e-01        0.492449436
## 117    0.801577695        0.05061580     2.390024e-02        0.163039119
## 118   -1.552027348        0.15161578     1.888328e-01        0.397870040
## 119    0.256191684       -0.15181950     4.654565e-01        0.749354407
## 120   -1.140817346       -0.36078496     4.817986e-01        0.773213328
## 121    0.103862451       -0.49574183     6.958527e-01        0.995581520
## 122   -0.963231452       -0.58585819     7.059334e-01        1.016203232
## 123    0.225410129       -0.71428488     9.176453e-01        1.185633442
## 124    0.741593126       -0.71820298     8.289334e-01        1.157233577
## 125   -0.167646649       -0.69948316     7.173197e-01        1.053852741
## 126   -0.166068108       -0.60240129     7.946151e-01        1.122482284
## 127    1.705292576       -0.44959529     5.818899e-01        0.899433382
## 128    1.003630978        0.30050367     2.061744e-01        0.456787830
```

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## 129   -0.356282331         0.33533125     4.600294e-02         0.267855587
## 130    0.416413623         0.16946491    -1.521445e-01         0.034128322
## 131   -0.143179259         0.01317615    -2.933552e-01        -0.132438519
## 132    0.185946597        -0.13440571    -4.137932e-01        -0.274502571
## 133   -0.605691853        -0.33814704    -4.261216e-01        -0.289044726
## 134   -1.121874851        -0.54624182    -2.414119e-01        -0.071168095
## 135    0.144115253        -0.68163403     1.115977e-01         0.345228682
## 136   -0.518082812        -0.75694866     1.485133e-01         0.388772910
## 137    0.230935023        -0.73039263     3.801601e-01         0.656380847
## 138   -2.005857965        -0.72995729     8.667112e-01         0.951415831
## 139    0.298023028        -0.70514264     9.671924e-01         1.117808761
## 140    0.508758288        -0.52534527     7.591916e-01         1.034491161
## 141    0.930228809        -0.46047891     5.332114e-01         0.835422327
## 142   -0.807745137        -0.46396166     4.511008e-01         0.726471484
## 143   -1.944294856        -0.52795734     7.228781e-01         0.852343006
## 144    0.018621222        -0.50619010     8.856843e-01         1.117770254
## 145   -1.035055080        -0.76434952     9.950272e-01         1.176653448
## 146   -0.423370336        -1.00901326     8.664861e-01         1.185487035
## 147    0.118069322        -0.97940982     8.226757e-01         1.160275475
## 148    0.759746351        -0.99029343     8.165599e-01         1.158664188
## 149    0.088077038        -0.92847448     7.555583e-01         1.104629237
## 150    1.209630615        -0.75172453     6.049873e-01         0.926340207
## 151    0.768428328        -0.36949186     2.837858e-01         0.548335245
## 152    0.767639057        -0.13005226     1.194592e-05         0.213606350
## 153    1.328810481        -0.85272450    -3.236768e-01        -0.168204669
## 154    0.901025795        -0.73561677    -6.349829e-01        -0.535409641
## 155    0.650037732        -0.66509093    -8.555397e-01        -0.795570065
## 156    0.387210610        -0.62068576    -1.036535e+00        -1.009065734
## 157    0.076237978        -0.60370732    -1.158210e+00        -1.152588205
## 158   -0.394956593        -0.59674180    -1.164727e+00        -1.160276097
## 159   -0.479408551        -0.61502628    -8.587431e-01        -0.801087461
## 160    0.309862087        -0.63505214    -5.221726e-01        -0.404226480
## 161    0.695026159        -0.65377196    -5.377688e-01        -0.421431469
## 162    1.389584320        -0.66465558    -8.259823e-01        -0.760705270
## 163    1.977590946        -0.62634525    -1.162010e+00        -1.157071213
## 164    1.711606741        -0.51707372    -1.534042e+00        -1.595905964
## 165    0.577424834        -0.32856945    -1.797870e+00        -1.907107713
## 166   -0.122658223        -0.17228070    -1.978560e+00        -2.120242008
## 167   -0.312872446        -0.08695313    -2.011769e+00        -2.159414585
## 168   -0.778542123        -0.05299624    -2.037918e+00        -2.190259289
## 169   -1.108457250        -0.04341866    -1.372837e+00        -1.405754469
## 170    0.235670647        -0.07519882    -9.888726e-01        -0.952844567
## 171   -1.260786483        -0.10001347    -1.024261e+00        -0.994587396
## 172   -0.040574076        -0.11786261    -4.777293e-01        -0.353808205
## 173   -1.933245067        -0.14137122     1.695438e-01         0.344421020
## 174   -2.215803955        -0.17924621     1.217410e+00         1.014318511
## 175   -0.310504634        -0.21015569     2.938316e+00         1.302865099
## 176    0.978374318        -0.24715999     1.863983e+00         1.275429093
## 177   -0.113186975        -0.25543154     1.264989e+00         1.184663450
## 178    0.167793372        -0.26370309     8.028843e-01         1.081926938
## 179    0.215149611        -0.35817290     5.958805e-01         0.915754250
## 180   -0.451784079        -0.47876338     5.416851e-01         0.850197366
## 181    0.155165042        -0.48224614     5.275486e-01         0.834383523
## 182   -0.219738511        -0.48616424     6.113724e-01         0.927657669
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## 183   -1.308142721        -0.49443579     1.333056e+00        1.275007182
## 184   -0.361017955        -0.50880217     1.297778e+00        1.295175289
## 185    0.122015675        -0.45569011     1.018747e+00        1.293810942
## 186    1.193055931        -0.46744442     9.464958e-01        1.260972733
## 187    1.837890043        -0.46222028     6.640548e-01        0.974275540
## 188    0.257770225         1.11285693     3.850672e-01        0.667803030
## 189    0.482712357         1.17511122     2.780708e-01        0.541594130
## 190    0.621623989         1.24389569     7.382191e-02        0.300669798
## 191    0.123594217         1.29831378    -6.433459e-02        0.137705603
## 192    0.265662931         1.32922326    -1.605212e-01        0.024247452
## 193    0.009939245         1.33401205    -2.152579e-01       -0.040317815
## 194    0.301180110         1.32965860    -2.729016e-01       -0.108312144
## 195   -0.385485345         1.31093878    -2.187411e-01       -0.044426477
## 196   -0.769070875         1.27915861    -1.167697e-01        0.072100371
## 197   -0.748549839        -0.09566003     1.006695e+00        1.182459924
## 198    0.836305603        -0.11525054     8.941796e-01        1.204647274
## 199    0.736068232         1.20732673     6.180690e-01        0.938551732
## 200    1.280664972         1.35839135     4.272697e-01        0.708794872
## 201   -1.380755620         2.69228759     3.715575e-01        0.631343603
## 202   -2.793550062         2.03883516     1.081813e+00        0.953234692
## 203    0.058874024         1.62090422     1.199348e+00        1.082619331
## 204   -0.518872083         1.28873620     8.965730e-01        1.081241887
## 205   -0.835369609         1.08107676     9.020193e-01        1.081882425
## 206   -0.784856288         0.94742593     1.412944e+00        1.083135213
## 207   -0.387063886         0.78591304     1.050918e+00        1.083086891
## 208    0.158322125         0.63310704     8.788817e-01        1.078061253
## 209    0.382474986         0.70711564     7.901890e-01        1.035598526
## 210    0.840251956         0.81856389     5.777485e-01        0.815008669
## 211    0.464559132         0.92217594     4.214816e-01        0.630860096
## 212    1.627154782         1.08717159     6.550102e-02        0.211526923
## 213   -1.360234583         1.19208967     1.799187e-01        0.255312917
## 214    0.593999517         1.22822328     6.716102e-02        0.211517965
## 215   -0.031892099         1.25260258     7.288236e-03        0.142861322
## 216   -0.067409278         1.21646897    -1.196277e-01       -0.006843888
## 217   -0.279723080         1.10110262    -7.209502e-02        0.049223832
## 218   -0.141600718         1.00619747    -3.984595e-02        0.087263609
## 219    0.907339960         0.94176645    -7.242570e-02        0.048833766
## 220    0.629516696         1.08107676    -1.571976e-01       -0.051159996
## 221   -0.233945383         0.98573627     1.070092e-01        0.255157098
## 222    1.645308007         1.24955517     7.416646e-02        0.221435122
## 223    2.400640008         2.19120581    -2.955362e-01       -0.214338907
## 224    2.466938742         1.48377063    -7.630251e-01       -0.765771206
## 225    1.561645319         1.77762832    -1.190292e+00       -1.269759275
## 226   -0.004267627         1.71232661    -1.433298e+00       -1.556399743
## 227    0.003625080         1.63831801    -1.567179e+00       -1.714320334
## 228   -0.971913429         1.59826630    -1.433971e+00       -1.557194031
## 229   -1.415483528         2.31963250    -1.101849e+00       -1.176334129
## 230   -0.356282331         1.22909397    -2.334914e-01       -0.163454031
## 231   -1.122664121         1.11024486     2.663712e-01        0.308147188
## 232    0.317754794         1.04058970     7.640400e-01        0.911132911
## 233    0.492183605         1.01142161     5.804546e-01        0.814019424
## 234    0.617677636         1.08630090     5.107278e-01        0.735792590
## 235    1.586112709         1.32835257     2.015522e-01        0.372007722
## 236    1.039937428         1.45024909    -1.514034e-01       -0.044325390
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## 237    0.669769498        1.67314559    -4.295159e-01        -0.372376406
## 238    0.492183605        1.61785681    -6.269036e-01        -0.605207463
## 239    0.757378539        1.54123614    -8.277424e-01        -0.842109307
## 240   -0.174750085        1.44589564    -9.818425e-01        -1.023879987
## 241   -0.707507765        1.39713703    -8.706780e-01        -0.892754561
## 242   -0.077669796        1.30049050    -8.334895e-01        -0.848888398
## 243    0.266452202        1.15726209    -8.759576e-01        -0.898982190
## 244    0.161479207        1.04015436    -8.238211e-01        -0.837483854
## 245   -0.252098607        0.97746472    -8.824034e-01        -0.906585346
## 246    0.919179020        0.97006386    -8.367232e-01        -0.852702757
## 247    0.877347676        0.95003800    -1.082432e+00        -1.142531253
## 248    1.933391790        1.02099919    -1.378312e+00        -1.491540350
## 249    0.568742857        1.21385690    -1.679170e+00        -1.846421303
## 250   -0.657783715        1.28177068    -1.811647e+00        -2.002686474
## 251   -0.336550566        1.20253794    -1.830599e+00        -2.025040595
## 252   -0.765913793        1.13027072    -1.788620e+00        -1.975523853
## 253    0.078605790        1.06148625    -1.714227e+00        -1.887773638
## 254    0.105440992        0.99574920    -1.772635e+00        -1.956668893
## 255    0.117280051        0.86949923    -1.826896e+00        -2.020673437
## 256    0.637409402        0.74890874    -1.797735e+00        -1.986275671
## 257    0.107808804        0.72191737    -1.700640e+00        -1.871746113
## 258    0.046245694        0.65792169    -1.738692e+00        -1.916630565
## 259    0.456666426        0.68230100    -1.794430e+00        -1.982377082
## 260    1.388795050        0.75108546    -1.632939e+00        -1.791889320
## 261    0.963378176        0.94220180    -1.881550e+00        -2.085141402
## 262    0.195417845        1.03841298    -2.037048e+00        -2.268560715
## 263   -0.112397704        1.03754229    -2.174573e+00        -2.430779626
## 264   -0.275776726        0.95918024    -2.252598e+00        -2.522815443
## 265   -0.740657132        0.76545184    -2.163444e+00        -2.417652614
## 266   -0.520450624        0.62918894    -2.054902e+00        -2.289620336
## 267   -0.683829646        0.53907258    -1.272491e+00        -1.366718407
## 268   -1.083989860        0.45243898    -4.866018e-01        -0.474615836
## 269   -3.829073140        0.37364159     1.965255e+00         0.816319117
## 270    0.021778304        0.33315453     3.447727e+00         1.083159085
## 271    1.616894264        0.38844331     2.517583e+00         1.076405176
## 272    1.783430369        0.80202079     1.260851e+00         0.869013642
## 273    1.254619041        1.32138705     4.951063e-01         0.623941915
## 274   -1.765919691        1.32312843     3.010039e-01         0.468889840
## 275   -2.344455069        1.28394740     1.059759e+00         0.959118232
## 276   -1.114771415        1.19818449     2.483932e+00         1.040862573
## 277   -0.050834594        1.06758108     2.248088e+00         1.024466457
## 278   -0.014528145        0.97441731     1.286844e+00         1.016630291
## 279   -0.587538628        0.93741300     1.369953e+00         1.043117022
## 280   -1.167652548        0.78591304     1.231549e+00         1.039659773
## 281   -0.818794925        0.65922773     1.244170e+00         1.043377083
## 282    0.050192047        0.60002084     1.854743e+00         1.047387812
## 283    1.513499811        0.68883117     9.848908e-01         0.968912273
## 284   -0.297087034        0.82378803     5.273275e-01         0.734444266
## 285    0.328015312        0.84860268     3.991247e-01         0.598581752
## 286    0.458244967        0.83858975     2.607347e-01         0.432798752
## 287   -0.413109817        0.82204665     2.744238e-01         0.433015108
## 288    0.050981318        0.74977943     2.377764e-01         0.399194164
## 289   -0.556757074        0.69187858     2.851684e-01         0.419501613
## 290   -0.047677512        0.61395187     3.195006e-01         0.485902648
```

```
## 291    0.347747078         0.44068467     3.320041e-01         0.516212645
## 292   -0.465201680         0.38887865     5.303835e-01         0.699069342
## 293    0.423517059         0.39410279     5.561272e-01         0.776003695
## 294   -0.516504271         0.36537004     6.635341e-01         0.862286785
## 295    0.835516332         0.34360280     6.456078e-01         0.873812730
## 296   -0.615952371         0.40063296     7.314807e-01         0.894361364
## 297    0.897868713         0.52514155     7.166240e-01         0.953562733
## 298    0.434566848         0.63615445     4.738602e-01         0.693211970
## 299    0.060452566         0.66401652     2.902110e-01         0.476586361
## 300   -0.604902583         0.59697343     2.405989e-01         0.418065728
## 301   -0.116344057         0.51817603     3.192065e-01         0.510788311
## 302   -2.059528369         0.44373209     6.057499e-01         0.646875836
## 303   -0.329447130         0.30442178     1.236966e+00         1.042723777
## 304    0.282237615         0.23563731     8.027683e-01         1.008299389
## 305    0.294076674         0.21212869     7.187187e-01         0.961727848
## 306    1.330389022         0.30877522     5.039782e-01         0.728738045
## 307    1.381691614         0.66096910     1.758603e-01         0.341702595
## 308    0.477187463         0.82901217    -8.504961e-02         0.033943080
## 309   -2.567818660         0.89518457     1.959468e-01         0.231415464
## 310   -2.963243250         0.94611990     1.628894e+00         0.972651535
## 311   -0.488879799         0.42893037     1.960939e+00         1.037103149
## 312   -1.372073643         0.31574074     1.186676e+00         1.034649150
##      PercentFull   Date eq_raw
## 1    0.999005379 Jan-93      0
## 2    1.022950196 Feb-93      0
## 3    1.021952495 Mar-93      0
## 4    1.019957093 Apr-93      0
## 5    1.018959393 May-93      0
## 6    0.970072059 Jun-93      0
## 7    0.351497629 Jul-93      0
## 8   -0.138373412 Aug-93      0
## 9   -0.391789388 Sep-93      0
## 10  -0.177283739 Oct-93      0
## 11   0.208826430 Nov-93      0
## 12   0.300614894 Dec-93      0
## 13   0.226785042 Jan-94      0
## 14   0.249732158 Feb-94      0
## 15   0.299617193 Mar-94      0
## 16   0.258711464 Apr-94      0
## 17   0.330545914 May-94      0
## 18   0.291635587 Jun-94      0
## 19   0.450269998 Jul-94      0
## 20   0.512127441 Aug-94      0
## 21   0.472219413 Sep-94      0
## 22   0.456256202 Oct-94      0
## 23   0.823410057 Nov-94      0
## 24   1.020954794 Dec-94      0
## 25   1.025943298 Jan-95      0
## 26   0.992021474 Feb-95      0
## 27   1.026940998 Mar-95      0
## 28   1.030931801 Apr-95      0
## 29   1.028936400 May-95      0
## 30   1.031929502 Jun-95      0
## 31   0.952113446 Jul-95      0
```

```
## 32   0.708674477 Aug-95      0
## 33   0.369456241 Sep-95      0
## 34   0.099079353 Oct-95      0
## 35  -0.158327425 Nov-95      0
## 36  -0.315964135 Dec-95      0
## 37  -0.372833075 Jan-96      0
## 38  -0.495550260 Feb-96      0
## 39  -0.644207663 Mar-96      0
## 40  -0.672143283 Apr-96      0
## 41  -0.779894957 May-96      0
## 42  -0.973448892 Jun-96      0
## 43  -1.271761399 Jul-96      0
## 44  -1.493250953 Aug-96      0
## 45  -1.558101498 Sep-96      0
## 46  -1.659866969 Oct-96      0
## 47  -0.674138684 Nov-96      0
## 48   0.651805538 Dec-96      0
## 49   0.656794041 Jan-97      0
## 50   0.840370969 Feb-97      0
## 51   1.020954794 Mar-97      0
## 52   1.015966291 Apr-97      0
## 53   1.021952495 May-97      0
## 54   1.031929502 Jun-97      0
## 55   0.961092753 Jul-97      0
## 56   0.713662981 Aug-97      0
## 57   0.357483833 Sep-97      0
## 58   0.099079353 Oct-97      0
## 59  -0.024635533 Nov-97      0
## 60   0.274674676 Dec-97      0
## 61   0.984039869 Jan-98      0
## 62   1.002996182 Feb-98      0
## 63   1.010977787 Mar-98      0
## 64   0.985037569 Apr-98      0
## 65   0.870301989 May-98      0
## 66   0.605911306 Jun-98      0
## 67   0.137989681 Jul-98      0
## 68  -0.376823877 Aug-98      0
## 69  -0.723026018 Sep-98      0
## 70  -0.470607742 Oct-98      0
## 71  -0.234152678 Nov-98      0
## 72   0.164927599 Dec-98      0
## 73   0.246739056 Jan-99      0
## 74   0.282656281 Feb-99      0
## 75   0.239755151 Mar-99      0
## 76   0.264697669 Apr-99      0
## 77   0.289640186 May-99      0
## 78   0.383424051 Jun-99      0
## 79   0.174904606 Jul-99      0
## 80  -0.317959536 Aug-99      0
## 81  -0.776901855 Sep-99      0
## 82  -1.149044214 Oct-99      0
## 83  -1.383503877 Nov-99      0
## 84  -1.430395810 Dec-99      0
## 85  -1.481278545 Jan-00      0
```

```
## 86  -1.562092301 Feb-00      0
## 87  -1.407448694 Mar-00      0
## 88  -1.319651033 Apr-00      0
## 89  -1.200924650 May-00      0
## 90  -0.725021419 Jun-00      0
## 91  -0.575366315 Jul-00      0
## 92  -1.125099397 Aug-00      0
## 93  -1.647894561 Sep-00      0
## 94  -2.016046117 Oct-00      0
## 95  -1.339605046 Nov-00      0
## 96  -0.729012222 Dec-00      0
## 97  -0.087490676 Jan-01      0
## 98   0.482196420 Feb-01      0
## 99   1.028936400 Mar-01      0
## 100  1.025943298 Apr-01      0
## 101  1.010977787 May-01      0
## 102  0.852343377 Jun-01      0
## 103  0.589948095 Jul-01      0
## 104  0.075134537 Aug-01      0
## 105 -0.017651628 Sep-01      0
## 106 -0.032617138 Oct-01      0
## 107 -0.111435493 Nov-01      0
## 108  0.023254101 Dec-01      0
## 109  0.152955191 Jan-02      0
## 110  0.506141236 Feb-02      0
## 111  0.690715865 Mar-02      0
## 112  1.017961692 Apr-02      0
## 113  1.018959393 May-02      0
## 114  0.953111147 Jun-02      0
## 115  0.835382465 Jul-02      0
## 116  0.480201018 Aug-02      0
## 117  0.135994279 Sep-02      0
## 118  0.212817233 Oct-02      0
## 119  0.567998679 Nov-02      0
## 120  0.591943496 Dec-02      0
## 121  0.817423853 Jan-03      0
## 122  0.839373268 Feb-03      0
## 123  1.010977787 Mar-03      0
## 124  0.982044467 Apr-03      0
## 125  0.878283595 May-03      0
## 126  0.947124943 Jun-03      0
## 127  0.720646885 Jul-03      0
## 128  0.271681573 Aug-03      0
## 129  0.080123040 Sep-03      0
## 130 -0.156332024 Oct-03      0
## 131 -0.325941142 Nov-03      0
## 132 -0.469610042 Dec-03      0
## 133 -0.484575552 Jan-04      0
## 134 -0.263085998 Feb-04      0
## 135  0.157943694 Mar-04      0
## 136  0.202840226 Apr-04      0
## 137  0.474214814 May-04      0
## 138  0.773525022 Jun-04      0
## 139  0.942136439 Jul-04      0
```

```
## 140  0.857331880 Aug-04      0
## 141  0.655796340 Sep-04      0
## 142  0.546049264 Oct-04      0
## 143  0.673754953 Nov-04      0
## 144  0.942136439 Dec-04      0
## 145  1.001998481 Jan-05      0
## 146  1.009980087 Feb-05      0
## 147  0.986035270 Mar-05      0
## 148  0.984039869 Apr-05      0
## 149  0.832389363 May-05      0
## 150  0.653800939 Jun-05      0
## 151  0.272679274 Jul-05      0
## 152 -0.061550458 Aug-05      0
## 153 -0.445665225 Sep-05      0
## 154 -0.814814482 Oct-05      0
## 155 -1.075214363 Nov-05      0
## 156 -1.288722311 Dec-05      0
## 157 -1.434386612 Jan-06      0
## 158 -1.441370517 Feb-06      0
## 159 -1.081200567 Mar-06      0
## 160 -0.682120289 Apr-06      0
## 161 -0.699081201 May-06      0
## 162 -1.040294838 Jun-06      0
## 163 -1.438377415 Jul-06      0
## 164 -1.879361122 Aug-06      0
## 165 -2.191641439 Sep-06      0
## 166 -2.405149387 Oct-06      0
## 167 -2.445057415 Nov-06      0
## 168 -2.475986136 Dec-06      0
## 169 -1.687802588 Jan-07      0
## 170 -1.233848773 Feb-07      0
## 171 -1.275752202 Mar-07      0
## 172 -0.631237554 Apr-07      0
## 173  0.069148333 May-07      0
## 174  0.741598600 Jun-07      0
## 175  1.031929502 Jul-07      0
## 176  1.003993882 Aug-07      0
## 177  0.912205419 Sep-07      0
## 178  0.808444546 Oct-07      0
## 179  0.641828531 Nov-07      0
## 180  0.575980285 Dec-07      0
## 181  0.560017074 Jan-08      0
## 182  0.654798640 Feb-08      0
## 183  1.002996182 Mar-08      0
## 184  1.022950196 Apr-08      0
## 185  1.022950196 May-08      0
## 186  0.989028372 Jun-08      0
## 187  0.701690572 Jul-08      0
## 188  0.393401058 Aug-08      0
## 189  0.265695369 Sep-08      0
## 190  0.025249502 Oct-08      8
## 191 -0.137375711 Nov-08     10
## 192 -0.252111291 Dec-08     10
## 193 -0.316961836 Jan-09     10
```

```
## 194 -0.384805483 Feb-09     10
## 195 -0.320952638 Mar-09     10
## 196 -0.205219358 Apr-09     10
## 197  0.910210017 May-09     14
## 198  0.932159432 Jun-09     20
## 199  0.665773347 Jul-09     21
## 200  0.475212515 Aug-09     21
## 201  0.397391861 Sep-09     22
## 202  0.898237609 Oct-09     23
## 203  1.031929502 Nov-09     23
## 204  1.030931801 Dec-09     24
## 205  1.030931801 Jan-10     24
## 206  1.031929502 Feb-10     24
## 207  1.031929502 Mar-10     24
## 208  1.026940998 Apr-10     24
## 209  0.983042168 May-10     24
## 210  0.755566410 Jun-10     24
## 211  0.567998679 Jul-10     24
## 212  0.135994279 Aug-10     24
## 213  0.182886212 Sep-10     24
## 214  0.137989681 Oct-10     24
## 215  0.067152931 Nov-10     26
## 216 -0.087490676 Dec-10     26
## 217 -0.029624036 Jan-11     26
## 218  0.009286291 Feb-11     26
## 219 -0.029624036 Mar-11     26
## 220 -0.133384908 Apr-11     26
## 221  0.181888511 May-11     26
## 222  0.146968987 Jun-11     28
## 223 -0.300000924 Jul-11     29
## 224 -0.867692618 Aug-11     31
## 225 -1.383503877 Sep-11     32
## 226 -1.678823282 Oct-11     32
## 227 -1.840450795 Nov-11     32
## 228 -1.677825581 Dec-11     33
## 229 -1.287724610 Jan-12     34
## 230 -0.247122787 Feb-12     34
## 231  0.236762049 Mar-12     34
## 232  0.855336479 Apr-12     34
## 233  0.756564110 May-12     34
## 234  0.674752654 Jun-12     41
## 235  0.301612594 Jul-12     47
## 236 -0.125403303 Aug-12     47
## 237 -0.462626137 Sep-12     49
## 238 -0.701076603 Oct-12     51
## 239 -0.944515572 Nov-12     52
## 240 -1.132083302 Dec-12     53
## 241 -0.996396008 Jan-13     54
## 242 -0.950501776 Feb-13     57
## 243 -1.003379913 Mar-13     60
## 244 -0.939527068 Apr-13     61
## 245 -1.010363818 May-13     61
## 246 -0.955490279 Jun-13     61
## 247 -1.253802787 Jul-13     61
```

```
## 248 -1.610979635 Aug-13     61
## 249 -1.975140388 Sep-13     61
## 250 -2.135770200 Oct-13     62
## 251 -2.159715016 Nov-13     83
## 252 -2.108832281 Dec-13     91
## 253 -2.018041518 Jan-14     94
## 254 -2.088878267 Feb-14     95
## 255 -2.153728812 Mar-14     95
## 256 -2.118809288 Apr-14     96
## 257 -2.002078307 May-14     96
## 258 -2.048970239 Jun-14     96
## 259 -2.115816186 Jul-14     97
## 260 -1.919269149 Aug-14     97
## 261 -2.220574759 Sep-14    100
## 262 -2.408142489 Oct-14    102
## 263 -2.574758505 Nov-14    110
## 264 -2.669540071 Dec-14    118
## 265 -2.562786097 Jan-15    144
## 266 -2.431089605 Feb-15    145
## 267 -1.483273946 Mar-15    150
## 268 -0.567384710 Apr-15    155
## 269  0.757561811 May-15    163
## 270  1.031929502 Jun-15    167
## 271  1.025943298 Jul-15    170
## 272  0.845359472 Aug-15    174
## 273  0.591943496 Sep-15    180
## 274  0.431313684 Oct-15    190
## 275  0.937147936 Nov-15    193
## 276  1.020954794 Dec-15    200
## 277  1.003993882 Jan-16    201
## 278  0.995014576 Feb-16    202
## 279  1.023947896 Mar-16    202
## 280  1.019957093 Apr-16    202
## 281  1.023947896 May-16    202
## 282  1.027938699 Jun-16    202
## 283  0.946127242 Jul-16    202
## 284  0.704683674 Aug-16    202
## 285  0.566003278 Sep-16    204
## 286  0.394398759 Oct-16    204
## 287  0.394398759 Nov-16    204
## 288  0.360476935 Dec-16    204
## 289  0.380430949 Jan-17    204
## 290  0.449272297 Feb-17    204
## 291  0.480201018 Mar-17    204
## 292  0.668766449 Apr-17    204
## 293  0.747584804 May-17    205
## 294  0.836380166 Jun-17    206
## 295  0.848352574 Jul-17    206
## 296  0.870301989 Aug-17    207
## 297  0.930164031 Sep-17    209
## 298  0.662780245 Oct-17    209
## 299  0.440292991 Nov-17    209
## 300  0.379433248 Dec-17    209
## 301  0.474214814 Jan-18    210
```

```
## 302  0.614890612 Feb-18    210
## 303  1.023947896 Mar-18    210
## 304  0.988030671 Apr-18    210
## 305  0.939143337 May-18    211
## 306  0.699695171 Jun-18    211
## 307  0.300614894 Jul-18    212
## 308 -0.015656226 Aug-18    213
## 309  0.186877014 Sep-18    213
## 310  0.950118045 Oct-18    213
## 311  1.016963991 Nov-18    213
## 312  1.013970889 Dec-18    213
```

```
train=sample(1:nrow(datam),270)
```

```
#Normal Regression Without CV, not the cum values

#Each i denotes power: linear, quadratic, cubic, x^4, x^5
set.seed(123)
meansq.error=rep(0,5)
for (i in 1:5){
    lm.fit =lm(CumulativeEqs~ poly(DisposalVolume, i) + poly(ProducedGas, i) + poly(ProducedOil, i) + po

    #Can print the summary by taking the model outside of loop, if needed
    summary(lm.fit)
    sum1 <- summary(lm.fit)
    datam[-train,]$CumulativeEqs
    #write.csv(sum1, "testing_summary_lm.csv")
    pred.lm.fit <- predict(lm.fit, datam[-train,])
    pred.lm.fit
    #table(pred.lm.fit, datam[-train,]$CumulativeEqs)
    # Test Accuracy
    #mean(abs(pred.lda$class != final_quality.test)
    diff <- abs(pred.lm.fit - datam[-train,'CumulativeEqs'])
    mean(diff>2)

#Gives the Mean Squared Error
    mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
    meansq.error[i]=mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
}
meansq.error
```

```
## [1] 0.020465465 0.011984302 0.005175054 0.002077299 0.001229018
```

```
#Normal Regression Without CV, WITH the cum values

#Each i denotes power: linear, quadratic, cubic, x^4, x^5
set.seed(123)
meansq.error=rep(0,5)
for (i in 1:5){
    lm.fit =lm(CumulativeEqs~ poly(CumDisposalVolume, i) + poly(CumProducedGas, i) + poly(Cum_ProducedO

    #Can print the summary by taking the model outside of loop, if needed
    summary(lm.fit)
    sum1 <- summary(lm.fit)
    datam[-train,]$CumulativeEqs
```

```
    #write.csv(sum1, "testing_summary_lm.csv")
    pred.lm.fit <- predict(lm.fit, datam[-train,])
    pred.lm.fit
    #table(pred.lm.fit, datam[-train,]$CumulativeEqs)
    # Test Accuracy
    #mean(abs(pred.lda$class != final_quality.test)
    diff <- abs(pred.lm.fit - datam[-train,'CumulativeEqs'])
    mean(diff>2)

#Gives the Mean Squared Error
    mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
    meansq.error[i]=mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
}
meansq.error
```

```
## [1] 0.0127378482 0.0035481619 0.0026477260 0.0014184386 0.0007353784
```

```
#Normal Regression Without CV, WITHOUT the cum values as well as raw values

#Each i denotes power: linear, quadratic, cubic, x^4, x^5
set.seed(123)
meansq.error=rep(0,5)
for (i in 1:5){
    lm.fit =lm(CumulativeEqs~ poly(WellCount, i) + poly(DomesticFlightsDFW, i) + poly(InternationalFligl

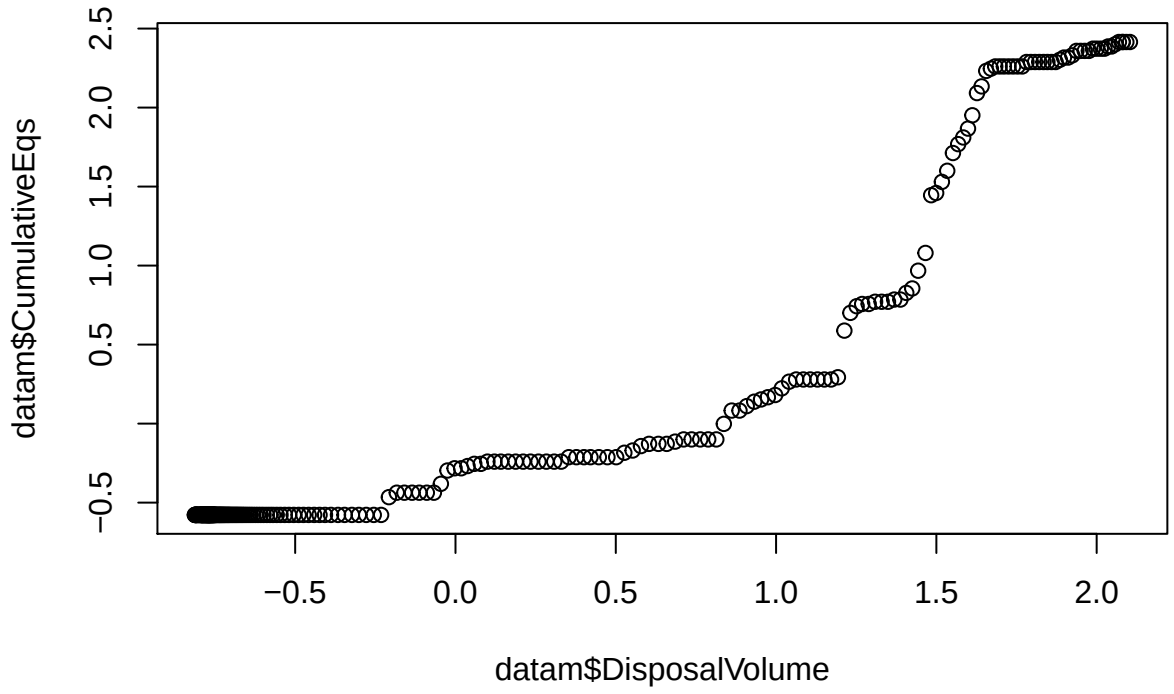
    #Can print the summary by taking the model outside of loop, if needed
    summary(lm.fit)
    sum1 <- summary(lm.fit)
    datam[-train,]$CumulativeEqs
    #write.csv(sum1, "testing_summary_lm.csv")
    pred.lm.fit <- predict(lm.fit, datam[-train,])
    pred.lm.fit
    #table(pred.lm.fit, datam[-train,]$CumulativeEqs)
    # Test Accuracy
    #mean(abs(pred.lda$class != final_quality.test)
    diff <- abs(pred.lm.fit - datam[-train,'CumulativeEqs'])
    mean(diff>2)

#Gives the Mean Squared Error
    mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
    meansq.error[i]=mean((datam[-train,]$CumulativeEqs-pred.lm.fit)^2)
}
meansq.error
```

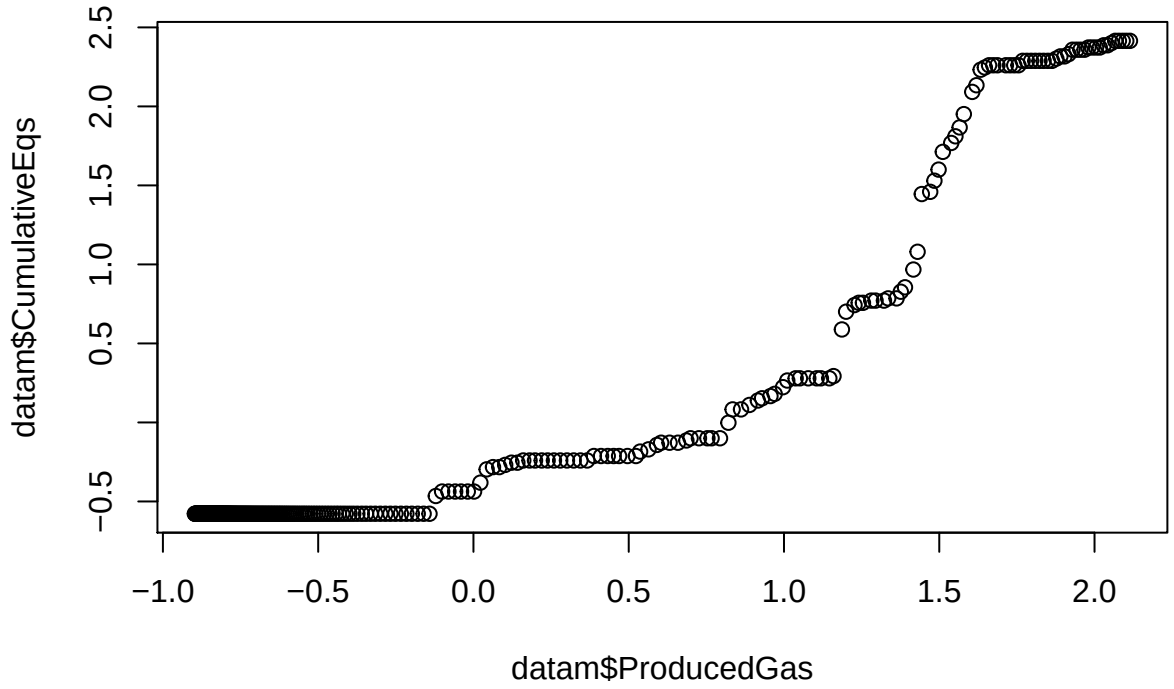
```
## [1] 0.2556652 0.2090534 0.1298984 0.1090780 0.1042159
```

```
#par(mfrow = c(2, 2))

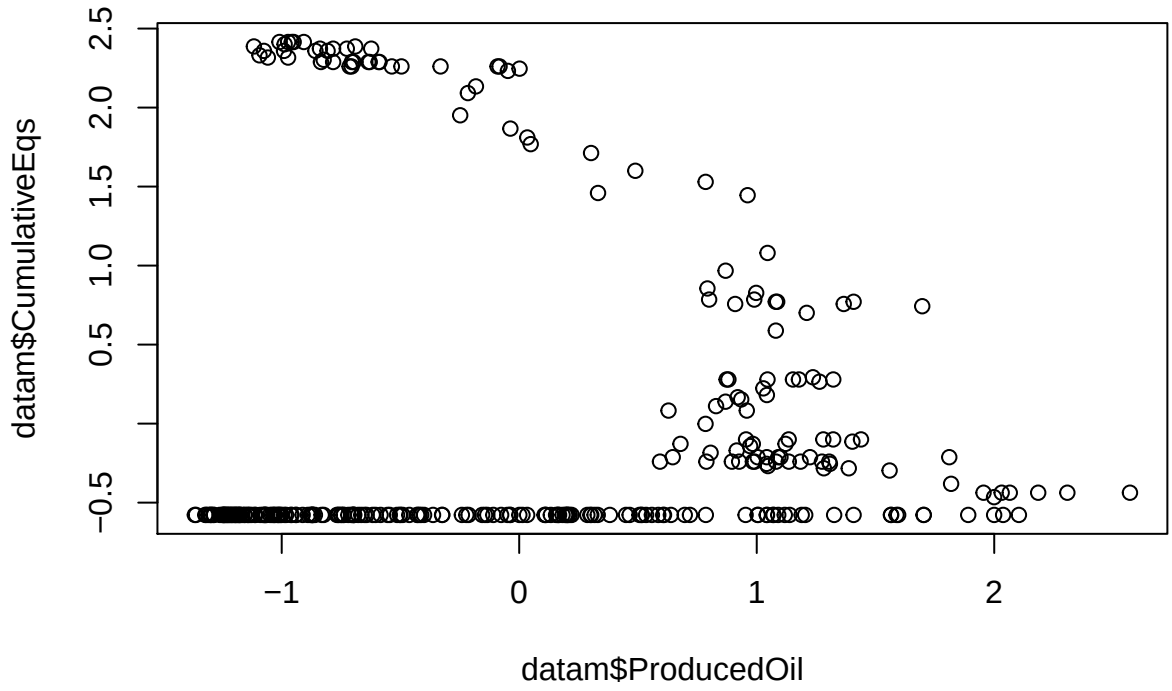
plot(datam$CumulativeEqs~datam$DisposalVolume)
```



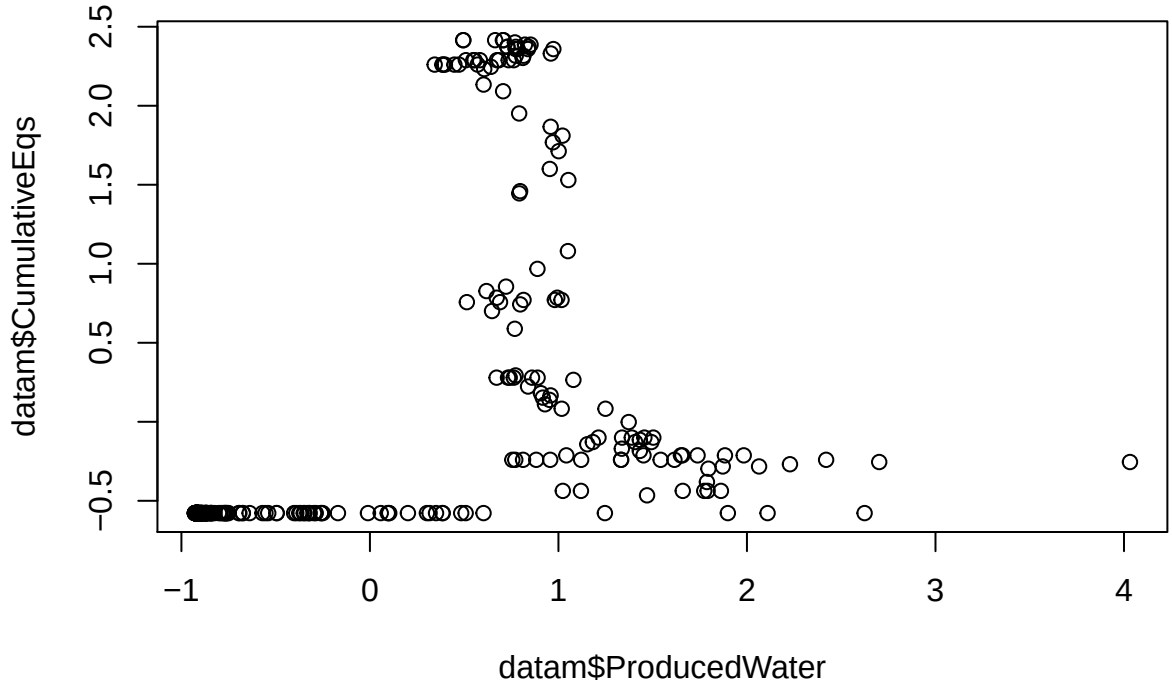

```
plot(datam$CumulativeEqs~datam$ProducedGas)
```



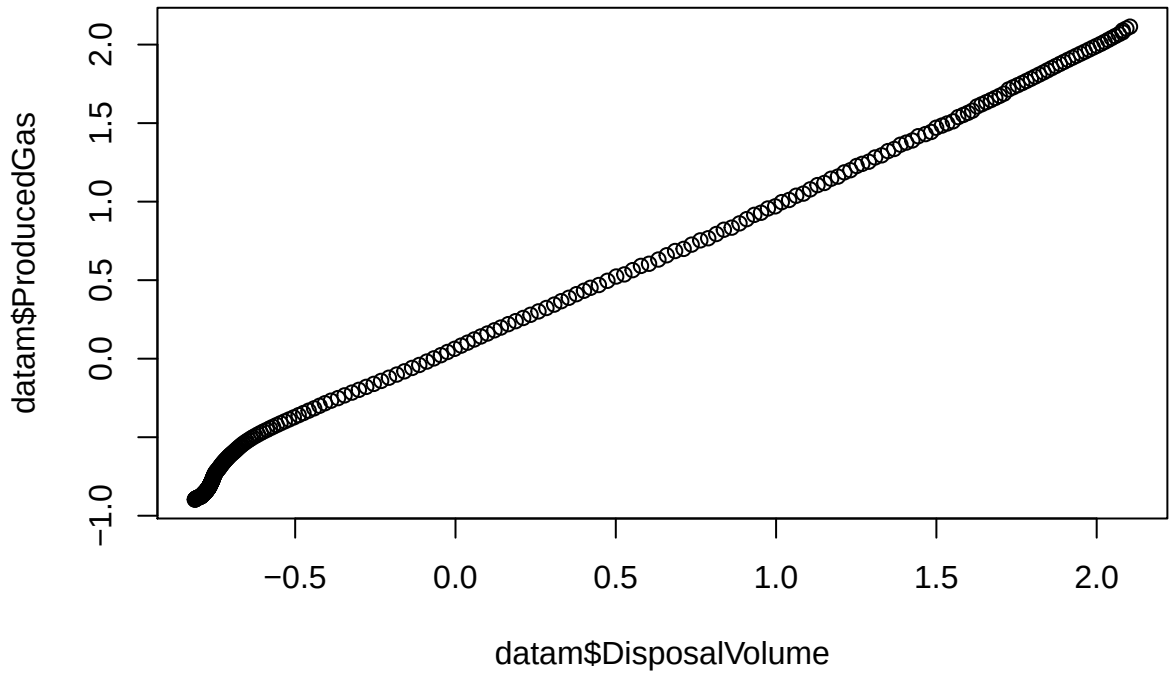

```
plot(datam$CumulativeEqs~datam$ProducedOil)
```




```
plot(datam$CumulativeEqs~datam$ProducedWater)
```




```
plot(datam$ProducedGas~datam$DisposalVolume)
```




```
#Cross Validation
#LOOCV
library(boot)
set.seed(123)
cv.error=rep(0,5)
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(DisposalVolume, i) + poly(ProducedGas, i) + poly(ProducedOil, i) + p
    cv.error[i]=cv.glm(datam,glm.fit)$delta[1]
}
cv.error
```

```
## [1] 0.01922967 0.01412814 0.01269900 0.01616941 0.02835159
```

```
cv.error=rep(0,5)
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(CumDisposalVolume, i) + poly(CumProducedGas, i) + poly(Cum_Produced
    cv.error[i]=cv.glm(datam,glm.fit)$delta[1]
}
cv.error
```

```
## [1] 0.014698316 0.003586558 0.002369311 0.001925494 0.003615116
```

```
cv.error=rep(0,5)
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(WellCount, i) + poly(DomesticFlightsDFW, i) + poly(InternationalFlig
    cv.error[i]=cv.glm(datam,glm.fit)$delta[1]
}
cv.error
```

```
## [1] 0.2664017 0.2322286 0.1256730 0.1789802 2.4346490
```

```
#K Fold CV
library(boot)
set.seed(123)
cv.error=rep(0,5)
```

```
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(DisposalVolume, i) + poly(ProducedGas, i) + poly(ProducedOil, i) + p
    cv.error[i]=cv.glm(datam,glm.fit, K=10)$delta[1]
}
cv.error
```

```
## [1] 0.01930121 0.01468741 0.01246870 0.01629180 0.03256691
```

```
cv.error=rep(0,5)
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(CumDisposalVolume, i) + poly(CumProducedGas, i) + poly(Cum_Produced
    cv.error[i]=cv.glm(datam,glm.fit, K=10)$delta[1]
}
cv.error
```

```
## [1] 0.014733344 0.003711859 0.002637809 0.001792505 0.011916800
```

```
cv.error=rep(0,5)
for (i in 1:5){
    glm.fit=glm(CumulativeEqs~ poly(WellCount, i) + poly(DomesticFlightsDFW, i) + poly(InternationalFlig
    cv.error[i]=cv.glm(datam,glm.fit, K=10)$delta[1]
}
cv.error
```

```
## [1] 0.2742743 0.2331359 0.1230080 0.2070665 4.3972318
```

```
library(leaps)

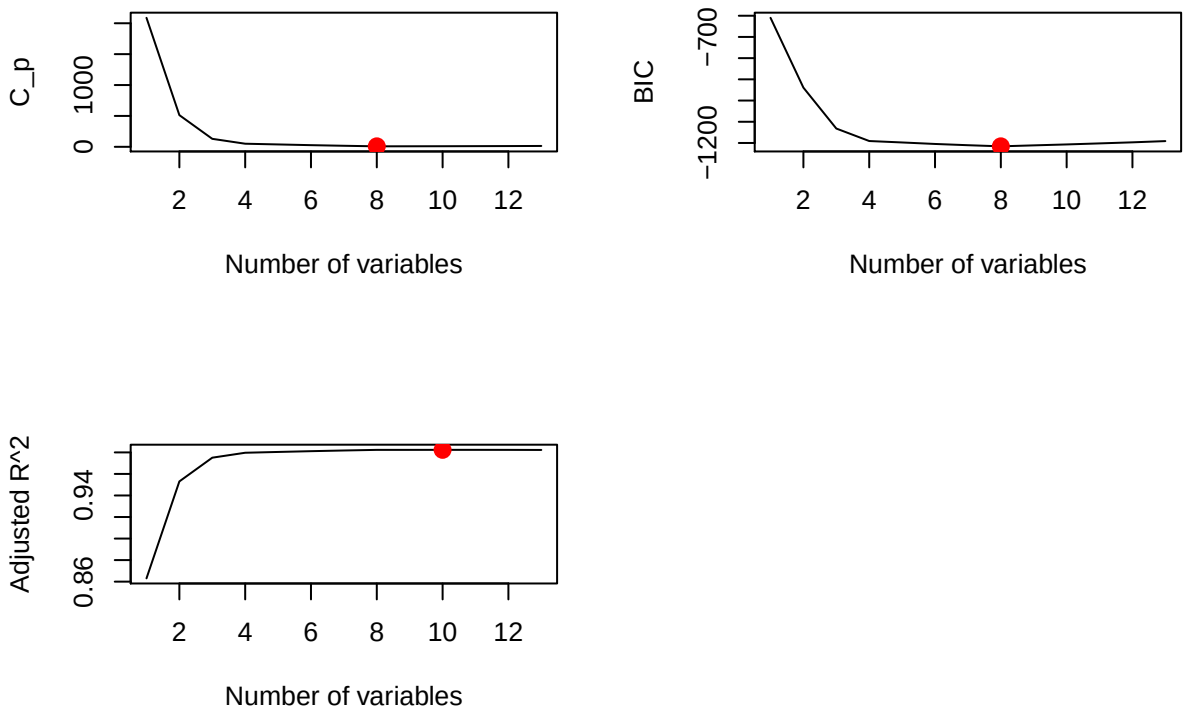
#data.full <- data.frame(y = y, x = x)

regfit.fwd <- regsubsets(CumulativeEqs ~ DisposalVolume + ProducedGas +
    ProducedOil + ProducedWater + WellCount + DomesticFlightsDFW +
    InternationalFlightsDFW + Precipitation + Evaporation + GroundwaterLvlDiff +
    ReservoirStorage + ConservationStorage + PercentFull, data = datam, nvmax = 13, method = "forward")

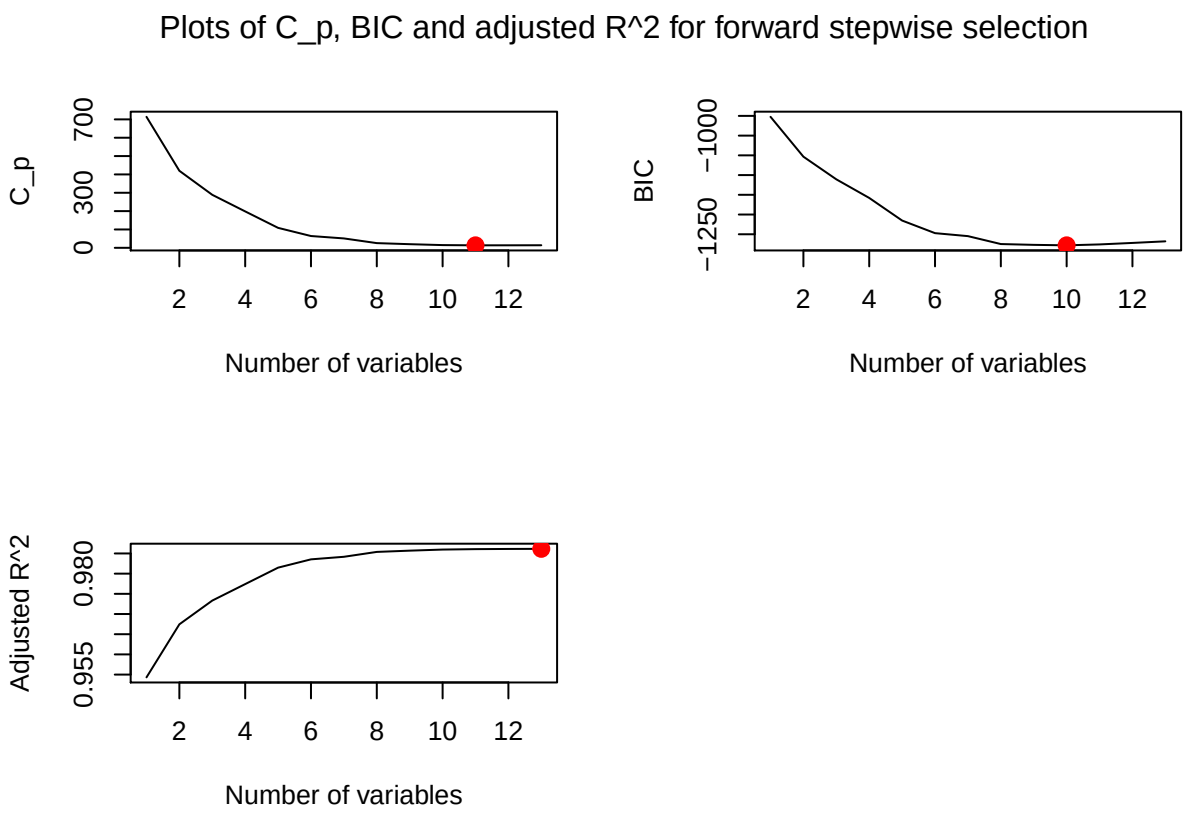
reg.summary.fwd <- summary(regfit.fwd)

par(mfrow = c(2, 2))

plot(reg.summary.fwd$cp, xlab = "Number of variables", ylab = "C_p", type = "l")
points(which.min(reg.summary.fwd$cp), reg.summary.fwd$cp[which.min(reg.summary.fwd$cp)], col = "red", c
plot(reg.summary.fwd$bic, xlab = "Number of variables", ylab = "BIC", type = "l")
points(which.min(reg.summary.fwd$bic), reg.summary.fwd$bic[which.min(reg.summary.fwd$bic)], col = "red"
plot(reg.summary.fwd$adjr2, xlab = "Number of variables", ylab = "Adjusted R^2", type = "l")
points(which.max(reg.summary.fwd$adjr2), reg.summary.fwd$adjr2[which.max(reg.summary.fwd$adjr2)], col =
mtext("Plots of C_p, BIC and adjusted R^2 for forward stepwise selection", side = 3, line = -2, outer =
```



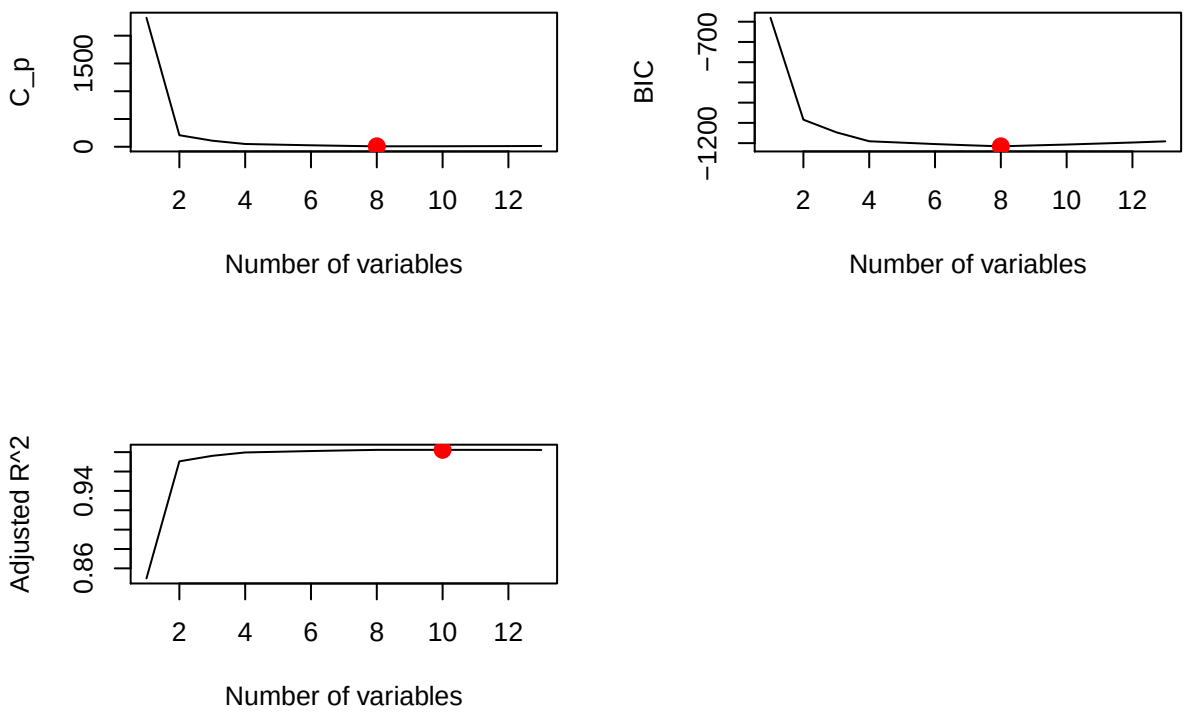

```r
#install.packages("leaps")
library(leaps)

#data.full <- data.frame(y = y, x = x)

regfit.fwd <- regsubsets(CumulativeEqs ~ CumDisposalVolume + CumProducedGas +
    Cum_ProducedOil + CumProducedWater + WellCount + DomesticFlightsDFW +
    InternationalFlightsDFW + Precipitation + Evaporation + GroundwaterLvlDiff +
    ReservoirStorage + ConservationStorage + PercentFull, data = datam, nvmax = 13, method = "forward")

reg.summary.fwd <- summary(regfit.fwd)

par(mfrow = c(2, 2))

plot(reg.summary.fwd$cp, xlab = "Number of variables", ylab = "C_p", type = "l")
points(which.min(reg.summary.fwd$cp), reg.summary.fwd$cp[which.min(reg.summary.fwd$cp)], col = "red", c
plot(reg.summary.fwd$bic, xlab = "Number of variables", ylab = "BIC", type = "l")
points(which.min(reg.summary.fwd$bic), reg.summary.fwd$bic[which.min(reg.summary.fwd$bic)], col = "red"
plot(reg.summary.fwd$adjr2, xlab = "Number of variables", ylab = "Adjusted R^2", type = "l")
points(which.max(reg.summary.fwd$adjr2), reg.summary.fwd$adjr2[which.max(reg.summary.fwd$adjr2)], col =
mtext("Plots of C_p, BIC and adjusted R^2 for forward stepwise selection", side = 3, line = -2, outer =
```




```
coef(regfit.fwd, which.max(reg.summary.fwd$adjr2))
```

```
##             (Intercept)       CumDisposalVolume          CumProducedGas
##           -2.445960e-16           -1.879284e-01            4.107199e+00
##         Cum_ProducedOil        CumProducedWater                WellCount
##            3.123295e-01           -2.132080e+00           -1.236864e+00
##      DomesticFlightsDFW InternationalFlightsDFW           Precipitation
##           -3.215004e-02           -7.559145e-02            1.137029e-02
##             Evaporation      GroundwaterLvlDiff        ReservoirStorage
##            9.437764e-03            2.120393e-02            7.264755e-02
##     ConservationStorage             PercentFull
##           -2.245401e-01            2.296920e-01
```

```
regfit.bwd <- regsubsets(CumulativeEqs ~ DisposalVolume + ProducedGas +
    ProducedOil + ProducedWater + WellCount + DomesticFlightsDFW +
    InternationalFlightsDFW + Precipitation + Evaporation + GroundwaterLvlDiff +
    ReservoirStorage + ConservationStorage + PercentFull, data = datam, nvmax = 13, method = "backward")

reg.summary.bwd <- summary(regfit.bwd)
par(mfrow = c(2, 2))
plot(reg.summary.bwd$cp, xlab = "Number of variables", ylab = "C_p", type = "l")
points(which.min(reg.summary.bwd$cp), reg.summary.bwd$cp[which.min(reg.summary.bwd$cp)], col = "red", c
plot(reg.summary.bwd$bic, xlab = "Number of variables", ylab = "BIC", type = "l")
points(which.min(reg.summary.bwd$bic), reg.summary.bwd$bic[which.min(reg.summary.bwd$bic)], col = "red"
plot(reg.summary.bwd$adjr2, xlab = "Number of variables", ylab = "Adjusted R^2", type = "l")
points(which.max(reg.summary.bwd$adjr2), reg.summary.bwd$adjr2[which.max(reg.summary.bwd$adjr2)], col =
mtext("Plots of C_p, BIC and adjusted R^2 for backward stepwise selection", side = 3, line = -2, outer =
```



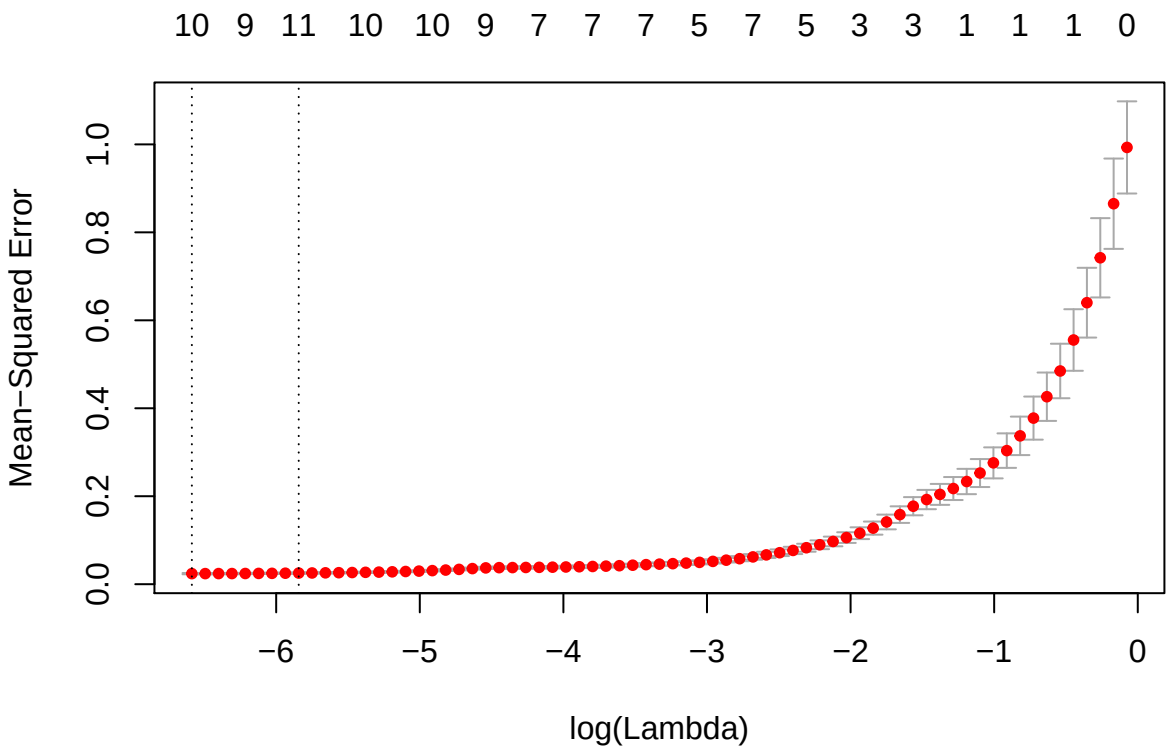

```
#install.packages("glmnet")
library(glmnet)
```

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

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

```
## Loaded glmnet 2.0-16
```

```
xmat <- model.matrix(CumulativeEqs ~ DisposalVolume + ProducedGas +
    ProducedOil + ProducedWater + WellCount + DomesticFlightsDFW +
    InternationalFlightsDFW + Precipitation + Evaporation + GroundwaterLvlDiff +
    ReservoirStorage + ConservationStorage + PercentFull, data = datam,)[, -1]

cv.lasso <- cv.glmnet(xmat, datam$CumulativeEqs, alpha = 1)
plot(cv.lasso)
```




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

```
## [1] 0.001377683
```

```
fit.lasso <- glmnet(xmat, datam$CumulativeEqs, alpha = 1)
predict(fit.lasso, s = bestlam, type = "coefficients")[1:14, ]
```

```
##             (Intercept)          DisposalVolume             ProducedGas
##           -3.898196e-16            0.000000e+00            1.615829e+00
##             ProducedOil           ProducedWater               WellCount
##            3.302549e-04            5.677487e-02           -8.026755e-01
##      DomesticFlightsDFW InternationalFlightsDFW           Precipitation
##            2.518408e-02            0.000000e+00            5.947969e-03
##             Evaporation      GroundwaterLvlDiff        ReservoirStorage
##           -3.212360e-03           -2.477207e-02            4.546149e-02
##     ConservationStorage             PercentFull
##            0.000000e+00            2.589572e-02
```

```
#install.packages("ctree")
#install.packages("party")
library(party)
```

```
## Loading required package: grid
```

```
## Loading required package: mvtnorm
```

```
## Loading required package: modeltools
```

```
## Loading required package: stats4
```

```
## Loading required package: strucchange
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

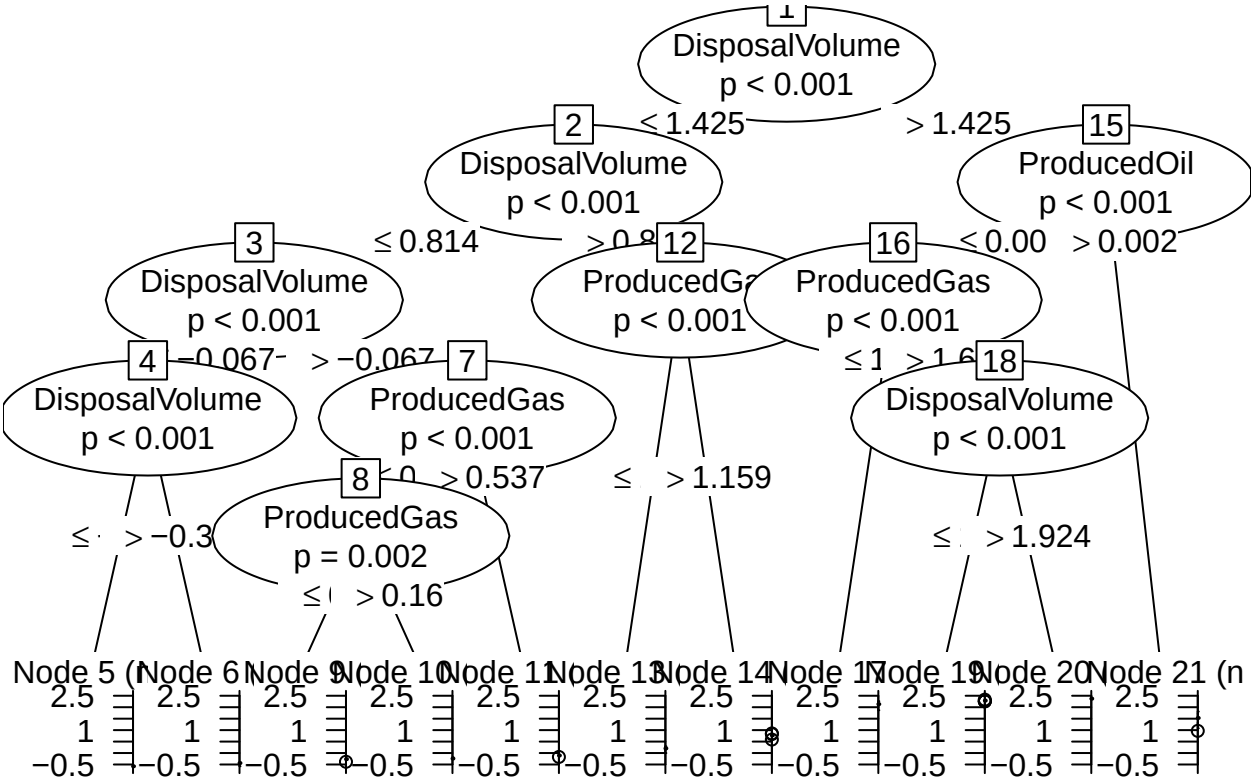
```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: sandwich
```

```
#library(ctree)
library(MASS)
set.seed(1)
tree.eq = ctree(formula=CumulativeEqs~ DisposalVolume + ProducedGas + ProducedOil + ProducedWater + Wel
summary(tree.eq)
```

```
##     Length      Class       Mode
##          1 BinaryTree         S4
```

```
plot(tree.eq)
```




```
tree.pred=predict(tree.eq, datam[-train,])
mean((tree.pred-datam[-train,'CumulativeEqs'])^2)
```

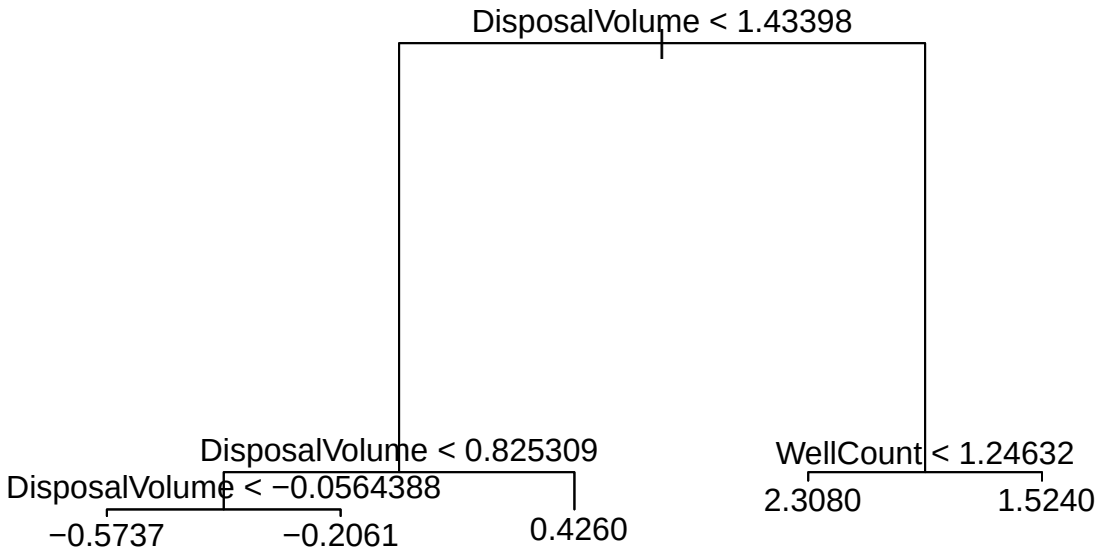
```
## [1] 0.001471998
```

```
#install.packages("tree")

require(tree)
```

```
## Loading required package: tree
```

```
tree.datam=tree(formula=CumulativeEqs~ DisposalVolume + ProducedGas + ProducedOil + ProducedWater + Wel
tree.pred=predict(tree.datam, datam[-train,])
```

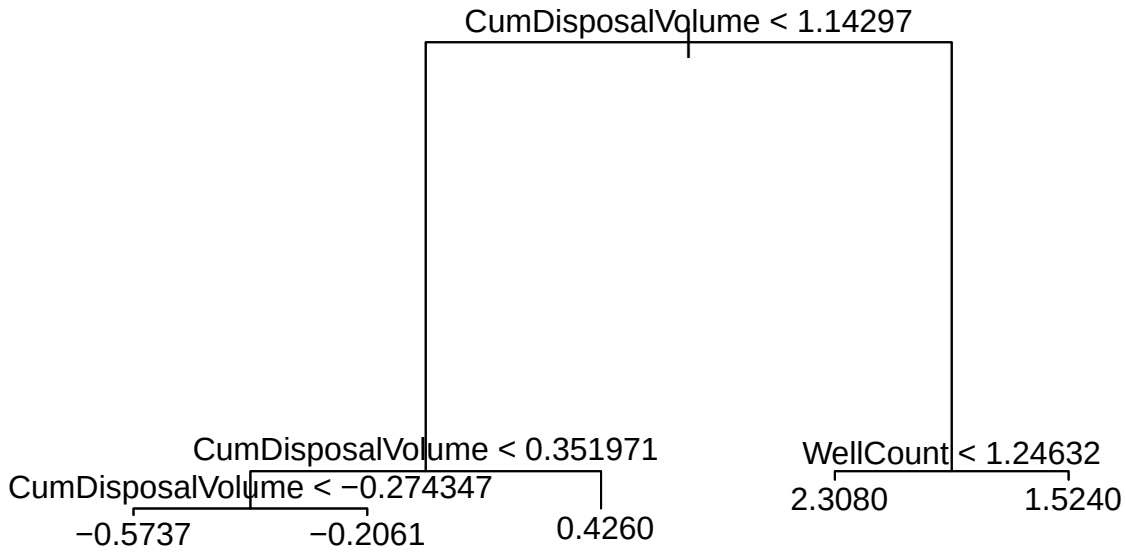
```
plot(tree.datam)
text(tree.datam)
```




```
mean((tree.pred-datam[-train,'CumulativeEqs'])^2)
```

```
## [1] 0.004074943
```

```
tree.datam=tree(formula=CumulativeEqs~ CumDisposalVolume + CumProducedGas + Cum_ProducedOil + CumProduc
tree.pred=predict(tree.datam, datam[-train,])

plot(tree.datam)
text(tree.datam)
```




```
tree.pred
```

```
##          3          4          6          8          9         11
## -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247
##         15         19         20         37         43         52
## -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247
##         58         82         94        102        130        131
```

```
## -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247
##        134        135        147        149        151        154
## -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247
##        161        163        176        177        188        192
## -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247 -0.5737247
##        195        198        216        219        225        248
## -0.5737247 -0.2061219 -0.2061219 -0.2061219 -0.2061219  0.4259924
##        252        276        278        281        285        308
##  0.4259924  2.3076852  2.3076852  2.3076852  2.3076852  2.3076852
```

```
datam[-train,'CumulativeEqs']
```

```
##  [1] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##  [7] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [13] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [19] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [25] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.4373106
## [31] -0.4373106 -0.2968092 -0.2125084 -0.2125084 -0.1282075  0.2792465
## [37]  0.7007507  2.2322158  2.2603161  2.2603161  2.2884164  2.4148676
```

```
mean((tree.pred-datam[-train,'CumulativeEqs'])^2)
```

```
## [1] 0.004074943
```

```
require(randomForest)
```

```
## Loading required package: randomForest
```

```
## randomForest 4.6-14
```

```
## Type rfNews() to see new features/changes/bug fixes.
```

```
#degree <- 269
#degree
set.seed(123)
datam.rf=randomForest(formula=CumulativeEqs~ CumDisposalVolume + CumProducedGas + Cum_ProducedOil + Cuml

tree.predrf=predict(datam.rf,datam[-train,])
tree.predrf
```

```
##          3          4          6          8          9         11
## -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##         15         19         20         37         43         52
## -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5755639
##         58         82         94        102        130        131
## -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##        134        135        147        149        151        154
## -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##        161        163        176        177        188        192
## -0.5533647 -0.5487984 -0.5511167 -0.5755639 -0.5619213 -0.4468459
##        195        198        216        219        225        248
## -0.4326272 -0.3289348 -0.2123725 -0.2121524 -0.1319753  0.3359037
##        252        276        278        281        285        308
##  0.6396256  2.1682666  2.1648969  2.2622012  2.2240808  2.3323863
```

```
datam[-train,'CumulativeEqs']
```

```
##  [1] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##  [7] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
```

```
## [13] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [19] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [25] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.4373106
## [31] -0.4373106 -0.2968092 -0.2125084 -0.2125084 -0.1282075  0.2792465
## [37]  0.7007507  2.2322158  2.2603161  2.2603161  2.2884164  2.4148676
```

```
mean((tree.predrf-datam[-train,'CumulativeEqs'])^2)
```

```
## [1] 0.0008252476
```

```
#install.packages("randomForest")
require(randomForest)

#degree <- 269
#degree
set.seed(123)
datam.rf=randomForest(formula=CumulativeEqs~ DisposalVolume + ProducedGas + ProducedOil + ProducedWater

tree.predrf=predict(datam.rf,datam[-train,])
tree.predrf
```

```
##          3          4          6          8          9         11
## -0.5778120 -0.5778120 -0.5778120 -0.5488687 -0.5778120 -0.5778120
##         15         19         20         37         43         52
## -0.5778120 -0.5778120 -0.5730349 -0.5778120 -0.5778120 -0.5778120
##         58         82         94        102        130        131
## -0.5778120 -0.5778120 -0.5436280 -0.5778120 -0.5778120 -0.5778120
##        134        135        147        149        151        154
## -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##        161        163        176        177        188        192
## -0.5422370 -0.5433844 -0.5270629 -0.5778120 -0.5489108 -0.4312222
##        195        198        216        219        225        248
## -0.4242393 -0.3392500 -0.2043148 -0.2265398 -0.1288281  0.3893715
##        252        276        278        281        285        308
##  0.7121688  2.1769988  2.1069565  2.2542324  2.2738534  2.3540352
```

```
datam[-train,'CumulativeEqs']
```

```
##  [1] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
##  [7] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [13] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [19] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120
## [25] -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.5778120 -0.4373106
## [31] -0.4373106 -0.2968092 -0.2125084 -0.2125084 -0.1282075  0.2792465
## [37]  0.7007507  2.2322158  2.2603161  2.2603161  2.2884164  2.4148676
```

```
mean((tree.predrf-datam[-train,'CumulativeEqs'])^2)
```

```
## [1] 0.001260473
```

```
importance(datam.rf)
```

```
##                           %IncMSE IncNodePurity
## DisposalVolume          8.4555057   83.37816088
## ProducedGas             8.5209836   89.31908547
## ProducedOil             3.4003794    7.18016678
## ProducedWater           3.0723005   10.10373003
## WellCount               4.8653856   31.59338378
```

```
## DomesticFlightsDFW       2.3516097    7.77027623
## InternationalFlightsDFW  3.4809849   22.48617320
## Precipitation           -0.6476025    0.79503791
## Evaporation              0.5202537    0.07216356
## GroundwaterLvlDiff       2.9288782    6.65255341
## ReservoirStorage         3.1796570    1.92570936
## ConservationStorage      2.9016457    2.62858159
## PercentFull              4.3993506    2.12866203
```