R Notebook

The following is your first chunk to start with. Remember, you can add chunks using the menu above (Insert -> R) or using the keyboard shortcut Ctrl+Alt+I. A good practice is to use different code chunks to answer different questions. You can delete this comment if you like.

Other useful keyboard shortcuts include Alt- for the assignment operator, and Ctrl+Shift+M for the pipe operator. You can delete these reminders if you don't want them in your report.

```r
#setwd("C:/") #Don't forget to set your working directory before you start!

library("tidyverse")

## — Attaching packages
——————————————————————————————————————————————— tidyverse 1.3.0
—

## ✓ ggplot2 3.2.1      ✓ purrr    0.3.3
## ✓ tibble  2.1.3      ✓ dplyr    0.8.3
## ✓ tidyr   1.0.0      ✓ stringr 1.4.0
## ✓ readr   1.3.1      ✓ forcats 0.4.0

## — Conflicts
———————————————————————————————————————————————
tidyverse_conflicts() —
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

library("tidymodels")

## — Attaching packages
——————————————————————————————————————————————— tidymodels 0.0.3
—

## ✓ broom      0.5.3      ✓ recipes    0.1.9
## ✓ dials      0.0.4      ✓ rsample    0.0.5
## ✓ infer      0.5.1      ✓ yardstick 0.0.4
## ✓ parsnip    0.0.5

## — Conflicts
———————————————————————————————————————————————
tidymodels_conflicts() —
## x scales::discard()    masks purrr::discard()
## x dplyr::filter()      masks stats::filter()
## x recipes::fixed()     masks stringr::fixed()
## x dplyr::lag()         masks stats::lag()
## x dials::margin()      masks ggplot2::margin()
```

```
## x yardstick::spec()   masks readr::spec()
## x recipes::step()     masks stats::step()
## x recipes::yj_trans() masks scales::yj_trans()

library("plotly")

##
## Attaching package: 'plotly'

## The following object is masked from 'package:ggplot2':
##
##     last_plot

## The following object is masked from 'package:stats':
##
##     filter

## The following object is masked from 'package:graphics':
##
##     layout

library("skimr")
library("lubridate")

##
## Attaching package: 'lubridate'

## The following object is masked from 'package:base':
##
##     date

library("car")

## Loading required package: carData

## Registered S3 methods overwritten by 'car':
##   method                          from
##   influence.merMod                lme4
##   cooks.distance.influence.merMod lme4
##   dfbeta.influence.merMod         lme4
##   dfbetas.influence.merMod        lme4

##
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':
##
##     recode

## The following object is masked from 'package:purrr':
##
##     some
```

```
dfbOrg <- read_csv("assignment2BikeShare.csv")

## Parsed with column specification:
## cols(
##   DATE = col_date(format = ""),
##   HOLIDAY = col_character(),
##   WEEKDAY = col_character(),
##   WEATHERSIT = col_double(),
##   TEMP = col_double(),
##   ATEMP = col_double(),
##   HUMIDITY = col_double(),
##   WINDSPEED = col_double(),
##   CASUAL = col_double(),
##   REGISTERED = col_double()
## )

dfbOrg

## # A tibble: 731 x 10
##      DATE       HOLIDAY WEEKDAY WEATHERSIT  TEMP ATEMP HUMIDITY WINDSPEED
CASUAL
##      <date>     <chr>   <chr>        <dbl> <dbl> <dbl>    <dbl>     <dbl>
<dbl>
##  1 2011-01-01 NO      NO               2    11    11       81        17
331
##  2 2011-01-02 NO      NO               2     9   6.5     71.5        17
131
##  3 2011-01-03 NO      YES              1     1     4       44        18
120
##  4 2011-01-04 NO      YES              1     2   2.5       64         9
108
##  5 2011-01-05 NO      YES              1   2.5     1     42.5        13
82
##  6 2011-01-06 NO      YES              1     2     2       52         6
88
##  7 2011-01-07 NO      YES              2     1     3     47.5        11
148
##  8 2011-01-08 NO      NO               2     1     5       51        17
68
##  9 2011-01-09 NO      NO               1     2   8.5       46        25
54
## 10 2011-01-10 NO      YES              1     2     6       50        15
41
## # … with 721 more rows, and 1 more variable: REGISTERED <dbl>

skim(dfbOrg)
```

Data summary

Name	dfbOrg
Number of rows	731

Number of columns	10	

_____

Column type frequency:

character	2
Date	1
numeric	7

_____

Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
HOLIDAY	0	1	2	3	0	2	0
WEEKDAY	0	1	2	3	0	2	0

Variable type: Date

skim_variable	n_missing	complete_rate	min	max	median	n_unique
DATE	0	1	2011-01-01	2012-12-31	2012-01-01	731

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
WEATHERSIT	0	1	1.40	0.54	1	1.0	1	2.00	3.00	� ▁ ▪ ▁ ▁
TEMP	0	1	15.87	8.83	1	8.0	16	23.15	34.00	▮ ▮ ▮ ▪ ▮ ▪
ATEMP	0	1	16.00	9.67	1	6.6	16	23.95	41.00	▮ ▮ ▮ ▮ ▮ ▁
HUMIDITY	0	1	63.17	15.47	17	51.0	62	74.00	100.00	▁ ▪ ▮ ▮ ▪
WINDSPEED	0	1	12.82	5.54	0	9.0	12	16.00	40.16	▪ ▮ ▪ ▁ ▁
CASUAL	0	1	848.18	686.62	2	315.5	713	1096.00	3410.00	▮ ▮ ▪ ▁ ▁
REGISTERED	0	1	3656.17	1560.26	20	2497.0	3662	4776.50	6946.00	▁ ▪ ▮ ▮ ▪

```
#1.a.i. Data Preparation
dfbOrg <-
  dfbOrg %>%
```

```r
  mutate(COUNT = CASUAL + REGISTERED)
dfbOrg
```

```
## # A tibble: 731 x 11
##    DATE       HOLIDAY WEEKDAY WEATHERSIT  TEMP ATEMP HUMIDITY WINDSPEED
CASUAL
##    <date>     <chr>   <chr>        <dbl> <dbl> <dbl>    <dbl>     <dbl>
<dbl>
##  1 2011-01-01 NO      NO               2    11    11       81        17
331
##  2 2011-01-02 NO      NO               2     9   6.5     71.5        17
131
##  3 2011-01-03 NO      YES              1     1     4       44        18
120
##  4 2011-01-04 NO      YES              1     2   2.5       64         9
108
##  5 2011-01-05 NO      YES              1   2.5     1     42.5        13
82
##  6 2011-01-06 NO      YES              1     2     2       52         6
88
##  7 2011-01-07 NO      YES              2     1     3     47.5        11
148
##  8 2011-01-08 NO      NO               2     1     5       51        17
68
##  9 2011-01-09 NO      NO               1     2   8.5       46        25
54
## 10 2011-01-10 NO      YES              1     2     6       50        15
41
## # … with 721 more rows, and 2 more variables: REGISTERED <dbl>, COUNT
<dbl>
```

```r
#1.a.ii
dfbOrg <-
  dfbOrg %>%
  mutate(MONTH = months(DATE,abbreviate = FALSE))
dfbOrg
```

```
## # A tibble: 731 x 12
##    DATE       HOLIDAY WEEKDAY WEATHERSIT  TEMP ATEMP HUMIDITY WINDSPEED
CASUAL
##    <date>     <chr>   <chr>        <dbl> <dbl> <dbl>    <dbl>     <dbl>
<dbl>
##  1 2011-01-01 NO      NO               2    11    11       81        17
331
##  2 2011-01-02 NO      NO               2     9   6.5     71.5        17
131
##  3 2011-01-03 NO      YES              1     1     4       44        18
120
##  4 2011-01-04 NO      YES              1     2   2.5       64         9
108
```

```
##  5 2011-01-05 NO        YES              1   2.5    1        42.5       13
82
##  6 2011-01-06 NO        YES              1   2      2        52          6
88
##  7 2011-01-07 NO        YES              2   1      3        47.5       11
148
##  8 2011-01-08 NO        NO               2   1      5        51         17
68
##  9 2011-01-09 NO        NO               1   2      8.5      46         25
54
## 10 2011-01-10 NO        YES              1   2      6        50         15
41
## # … with 721 more rows, and 3 more variables: REGISTERED <dbl>, COUNT
<dbl>,
## #   MONTH <chr>
```

```
dfbStd <- cbind(dfbOrg[1:4], scale(dfbOrg[5:8]), dfbOrg[9:12])
dfbStd
```

```
##            DATE HOLIDAY WEEKDAY WEATHERSIT        TEMP        ATEMP
HUMIDITY
## 1   2011-01-01     NO      NO           2 -0.55208087 -0.5166362098
1.15262592
## 2   2011-01-02     NO      NO           2 -0.77864711 -0.9820289892
0.53843749
## 3   2011-01-03     NO      YES          1 -1.68491207 -1.2405805333 -
1.23947638
## 4   2011-01-04     NO      YES          1 -1.57162895 -1.3957114597
0.05355189
## 5   2011-01-05     NO      YES          1 -1.51498739 -1.5508423862 -
1.33645350
## 6   2011-01-06     NO      YES          1 -1.57162895 -1.4474217685 -
0.72226507
## 7   2011-01-07     NO      YES          2 -1.68491207 -1.3440011509 -
1.01319644
## 8   2011-01-08     NO      NO           2 -1.68491207 -1.1371599156 -
0.78691649
## 9   2011-01-09     NO      NO           1 -1.57162895 -0.7751877539 -
1.11017356
## 10  2011-01-10     NO      YES          1 -1.57162895 -1.0337392980 -
0.85156790
## 11  2011-01-11     NO      YES          2 -1.68491207 -1.2922908421 -
0.39900801
## 12  2011-01-12     NO      YES          1 -1.68491207 -1.0854496068 -
0.52831083
## 13  2011-01-13     NO      YES          1 -1.57162895 -0.9303186804 -
0.94854502
## 14  2011-01-14     NO      YES          1 -1.57162895 -1.3440011509 -
0.59296225
```

```
## 15   2011-01-15    NO      NO           2 -1.40170427 -1.2922908421 -
0.72226507
## 16   2011-01-16    NO      NO           1 -1.51498739 -1.4474217685 -
0.88389361
## 17   2011-01-17    YES     YES          2 -1.68491207 -1.2405805333 -
0.98087073
## 18   2011-01-18    NO      YES          2 -1.68491207 -1.3440011509
1.54053440
## 19   2011-01-19    NO      YES          2 -1.17513803 -1.3957114597
0.53843749
## 20   2011-01-20    NO      YES          2 -1.34506271 -1.4474217685 -
0.46365942
## 21   2011-01-21    NO      YES          1 -1.57162895 -1.1371599156 -
1.36877921
## 22   2011-01-22    NO      NO           1 -1.06185491 -0.5166362098 -
1.36877921
## 23   2011-01-23    NO      NO           1 -1.34506271 -0.6200568275 -
1.36877921
## 24   2011-01-24    NO      YES          1 -1.51498739 -0.9303186804 -
0.91621932
## 25   2011-01-25    NO      YES          2 -1.57162895 -1.2405805333
0.11820330
## 26   2011-01-26    NO      YES          3 -1.57162895 -1.2405805333
1.92844289
## 27   2011-01-27    NO      YES          1 -1.62827051 -1.4474217685
0.44146037
## 28   2011-01-28    NO      YES          2 -1.68491207 -1.4474217685
1.08797451
## 29   2011-01-29    NO      NO           1 -1.68491207 -1.3957114597
0.05355189
## 30   2011-01-30    NO      NO           1 -1.45834583 -1.4474217685
0.44146037
## 31   2011-01-31    NO      YES          2 -1.68491207 -1.2405805333 -
0.26970518
## 32   2011-02-01    NO      YES          2 -1.57162895 -1.5508423862
1.50820870
## 33   2011-02-02    NO      YES          2 -1.51498739 -1.3957114597
1.92844289
## 34   2011-02-03    NO      YES          1 -1.68491207 -1.1888702244 -
1.23947638
## 35   2011-02-04    NO      YES          2 -1.45834583 -1.4991320773 -
0.26970518
## 36   2011-02-05    NO      NO           2 -1.57162895 -1.5508423862
2.38100278
## 37   2011-02-06    NO      NO           1 -1.28842115 -1.3440011509 -
0.14040235
## 38   2011-02-07    NO      YES          1 -1.23177959 -1.1371599156
0.76471744
## 39   2011-02-08    NO      YES          1 -1.45834583 -1.2405805333 -
1.49808204
```

```
## 40   2011-02-09       NO      YES         2 -1.57162895 -1.0337392980 -
1.23947638
## 41   2011-02-10       NO      YES         1 -1.57162895 -1.0854496068 -
1.40110492
## 42   2011-02-11       NO      YES         1 -1.34506271 -1.2405805333 -
0.26970518
## 43   2011-02-12       NO       NO         1 -1.40170427 -1.4474217685 -
1.27180209
## 44   2011-02-13       NO       NO         1 -0.72200555 -1.0337392980 -
1.75668769
## 45   2011-02-14       NO      YES         1 -0.66536399 -1.0337392980 -
1.46575633
## 46   2011-02-15       NO      YES         1 -1.34506271 -1.2922908421 -
2.01529335
## 47   2011-02-16       NO      YES         1 -0.89193023 -1.0854496068 -
1.23947638
## 48   2011-02-17       NO      YES         1 -0.26887307 -0.2580846658 -
0.56063654
## 49   2011-02-18       NO      YES         1 -0.04230683 -0.0512434305 -
0.78691649
## 50   2011-02-19       NO       NO         1 -0.55208087 -0.5166362098 -
2.98506455
## 51   2011-02-20       NO       NO         1 -1.11849647 -1.2405805333 -
1.33645350
## 52   2011-02-21      YES      YES         2 -1.00521335 -1.1371599156
0.18285472
## 53   2011-02-22       NO      YES         1 -1.57162895 -1.0337392980 -
0.20505377
## 54   2011-02-23       NO      YES         1 -1.45834583 -1.0337392980 -
0.98087073
## 55   2011-02-24       NO      YES         2 -1.00521335 -1.2405805333
0.44146037
## 56   2011-02-25       NO      YES         2 -1.00521335 -1.0337392980 -
0.20505377
## 57   2011-02-26       NO       NO         1 -1.23177959 -1.3440011509 -
0.46365942
## 58   2011-02-27       NO       NO         1 -0.77864711 -0.8268980627 -
0.07575094
## 59   2011-02-28       NO      YES         2 -0.66536399 -0.8268980627
1.92844289
## 60   2011-03-01       NO      YES         1 -1.40170427 -1.2405805333 -
0.33435659
## 61   2011-03-02       NO      YES         1 -1.06185491 -1.2922908421 -
1.69203628
## 62   2011-03-03       NO      YES         1 -1.62827051 -1.3440011509 -
1.88599052
## 63   2011-03-04       NO      YES         2 -1.17513803 -1.2405805333
0.27983184
## 64   2011-03-05       NO       NO         2 -0.43879775 -0.4132155922
0.89402027
```

```
## 65   2011-03-06   NO   NO    2 -0.49543931 -0.4649259010  2.38100278
## 66   2011-03-07   NO   YES   1 -1.34506271 -1.2405805333 -0.98087073
## 67   2011-03-08   NO   YES   1 -1.11849647 -1.3440011509 -1.14249926
## 68   2011-03-09   NO   YES   2 -1.00521335 -1.3440011509  0.82936885
## 69   2011-03-10   NO   YES   3 -0.60872243 -0.6717671363  2.38100278
## 70   2011-03-11   NO   YES   2 -1.00521335 -1.2405805333 -0.39900801
## 71   2011-03-12   NO   NO    1 -0.83528867 -1.0854496068  0.02122618
## 72   2011-03-13   NO   NO    1 -0.72200555 -0.7751877539 -0.62528795
## 73   2011-03-14   NO   YES   1 -0.94857179 -1.0854496068 -1.01319644
## 74   2011-03-15   NO   YES   2 -1.00521335 -1.1371599156  0.31215754
## 75   2011-03-16   NO   YES   2 -0.77864711 -0.8268980627  1.21727733
## 76   2011-03-17   NO   YES   1 -0.43879775 -0.4132155922 -0.01109952
## 77   2011-03-18   NO   YES   1  0.35418409  0.3107287312 -0.72226507
## 78   2011-03-19   NO   NO    1 -0.21223151 -0.2063743570 -1.62738487
## 79   2011-03-20   NO   NO    1 -0.89193023 -1.1371599156 -0.75459078
## 80   2011-03-21   NO   YES   2 -0.38215619 -0.3615052834  0.73239173
## 81   2011-03-22   NO   YES   1 -0.32551463 -0.3097949746 -0.43133371
## 82   2011-03-23   NO   YES   2 -0.89193023 -1.1371599156  1.54053440
## 83   2011-03-24   NO   YES   2 -1.17513803 -1.4474217685  0.82936885
## 84   2011-03-25   NO   YES   1 -1.28842115 -1.3440011509 -1.23947638
## 85   2011-03-26   NO   NO    1 -1.34506271 -1.4474217685 -1.36877921
## 86   2011-03-27   NO   NO    2 -1.34506271 -1.3440011509 -1.17482497
## 87   2011-03-28   NO   YES   1 -1.34506271 -1.3440011509 -2.40320183
## 88   2011-03-29   NO   YES   1 -0.94857179 -1.1888702244 -2.27389900
## 89   2011-03-30   NO   YES   2 -1.00521335 -1.1371599156 -0.39900801
```

```
## 90  2011-03-31    NO     YES         3 -1.28842115 -1.4991320773
1.92844289
## 91  2011-04-01    NO     YES         2 -1.00521335 -1.2405805333 -
0.14040235
## 92  2011-04-02    NO      NO         2 -1.00521335 -1.1888702244
0.15052901
## 93  2011-04-03    NO      NO         1 -0.55208087 -0.5166362098 -
1.23947638
## 94  2011-04-04    NO     YES         1  0.69403345  0.5692802753 -
1.30412780
## 95  2011-04-05    NO     YES         2 -0.66536399 -1.0337392980 -
0.20505377
## 96  2011-04-06    NO     YES         1 -0.38215619 -0.3615052834 -
1.43343062
## 97  2011-04-07    NO     YES         1 -0.43879775 -0.4132155922 -
0.01109952
## 98  2011-04-08    NO     YES         2 -0.89193023 -1.0337392980
1.54053440
## 99  2011-04-09    NO      NO         2 -0.77864711 -0.8268980627
1.54053440
## 100 2011-04-10    NO      NO         2 -0.49543931 -0.4649259010
1.60518582
## 101 2011-04-11    NO     YES         2  0.52410877  0.4658596576
0.63541461
## 102 2011-04-12    NO     YES         2  0.01433473  0.0004668783
0.89402027
## 103 2011-04-13    NO     YES         2 -0.49543931 -0.4649259010
1.41123158
## 104 2011-04-14    NO     YES         1 -0.21223151 -0.2063743570 -
0.52831083
## 105 2011-04-15   YES     YES         1 -0.32551463 -0.3097949746
0.24750613
## 106 2011-04-16    NO      NO         3 -0.43879775 -0.4132155922
1.60518582
## 107 2011-04-17    NO      NO         1 -0.26887307 -0.2580846658 -
1.30412780
## 108 2011-04-18    NO     YES         1  0.12761785  0.1038874959 -
0.91621932
## 109 2011-04-19    NO     YES         2  0.01433473  0.0004668783
0.27983184
## 110 2011-04-20    NO     YES         1  0.69403345  0.6209905841 -
0.56063654
## 111 2011-04-21    NO     YES         1 -0.26887307 -0.2580846658 -
1.33645350
## 112 2011-04-22    NO     YES         2 -0.89193023 -1.1371599156
0.18285472
## 113 2011-04-23    NO      NO         2 -0.21223151 -0.2063743570
1.60518582
## 114 2011-04-24    NO      NO         2  0.35418409  0.3107287312
1.28192875
```

```
## 115 2011-04-25    NO    YES    1  0.58075033  0.5175699665
0.70006603
## 116 2011-04-26    NO    YES    1  0.75067501  0.6727008929
0.70006603
## 117 2011-04-27    NO    YES    2  0.69403345  0.6209905841
1.28192875
## 118 2011-04-28    NO    YES    2  0.69403345  0.6209905841
0.95867168
## 119 2011-04-29    NO    YES    1  0.12761785  0.1038874959 -
1.17482497
## 120 2011-04-30    NO    NO     1 -0.32551463 -0.3097949746 -
0.59296225
## 121 2011-05-01    NO    NO     2 -0.21223151 -0.2063743570
0.89402027
## 122 2011-05-02    NO    YES    2  0.41082565  0.3624390400
0.63541461
## 123 2011-05-03    NO    YES    2  0.69403345  0.6209905841
0.21518042
## 124 2011-05-04    NO    YES    2 -0.55208087 -0.5166362098
0.73239173
## 125 2011-05-05    NO    YES    1 -0.04230683 -0.0512434305 -
1.56273345
## 126 2011-05-06    NO    YES    1 -0.21223151 -0.2063743570 -
0.07575094
## 127 2011-05-07    NO    NO     1  0.24090097  0.2073081136 -
0.91621932
## 128 2011-05-08    NO    NO     1  0.12761785  0.1038874959 -
0.01109952
## 129 2011-05-09    NO    YES    1  0.18425941  0.1555978047 -
0.46365942
## 130 2011-05-10    NO    YES    1  0.18425941  0.1555978047 -
0.72226507
## 131 2011-05-11    NO    YES    1  0.18425941  0.1555978047 -
0.10807664
## 132 2011-05-12    NO    YES    1  0.24090097  0.2073081136
0.95867168
## 133 2011-05-13    NO    YES    2  0.12761785  0.1038874959
1.60518582
## 134 2011-05-14    NO    NO     2  0.12761785  0.1038874959
1.99309430
## 135 2011-05-15    NO    NO     2  0.29754253  0.2590184224
1.44355728
## 136 2011-05-16    NO    YES    1  0.41082565  0.3624390400
1.28192875
## 137 2011-05-17    NO    YES    2  0.35418409  0.3107287312
1.60518582
## 138 2011-05-18    NO    YES    2  0.24090097  0.2073081136
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## 139 2011-05-19    NO    YES    2  0.18425941  0.1555978047
1.60518582
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## 140 2011-05-20    NO    YES        1  0.29754253  0.2590184224
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## 141 2011-05-21    NO    NO         1  0.63739189  0.5692802753 -
0.04342523
## 142 2011-05-22    NO    NO         1  0.69403345  0.6209905841
0.50611178
## 143 2011-05-23    NO    YES        2  0.69403345  0.7244112017
1.60518582
## 144 2011-05-24    NO    YES        2  0.86395813  0.7761215105
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## 145 2011-05-25    NO    YES        1  0.97724125  0.8795421282
0.24750613
## 146 2011-05-26    NO    YES        1  1.20380749  1.1898039810
0.15052901
## 147 2011-05-27    NO    YES        1  1.03388281  0.9312524370
0.11820330
## 148 2011-05-28    NO    NO         1  0.92059969  0.8278318193
0.70006603
## 149 2011-05-29    NO    NO         1  0.92059969  0.9312524370
1.28192875
## 150 2011-05-30    YES   YES        1  1.26044905  1.3449349075
0.44146037
## 151 2011-05-31    NO    YES        1  1.60029841  1.7586173780 -
0.17272806
## 152 2011-06-01    NO    YES        2  1.37373217  1.5517761428
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## 153 2011-06-02    NO    YES        1  1.26044905  1.0346730546 -
2.17692188
## 154 2011-06-03    NO    YES        1  0.69403345  0.5175699665 -
1.85366481
## 155 2011-06-04    NO    NO         1  0.80731657  0.7244112017 -
1.07784785
## 156 2011-06-05    NO    NO         2  0.80731657  0.7244112017
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## 157 2011-06-06    NO    YES        1  0.97724125  0.8795421282 -
0.23737947
## 158 2011-06-07    NO    YES        1  1.26044905  1.2932245987 -
0.23737947
## 159 2011-06-08    NO    YES        1  1.71358153  1.8620379956 -
0.07575094
## 160 2011-06-09    NO    YES        2  1.60029841  1.7069070692 -
0.85156790
## 161 2011-06-10    NO    YES        1  1.48701529  1.5000658339 -
0.17272806
## 162 2011-06-11    NO    NO         1  1.20380749  1.2415142899 -
0.07575094
## 163 2011-06-12    NO    NO         1  0.97724125  0.9829627458
0.95867168
## 164 2011-06-13    NO    YES        1  0.80731657  0.6727008929 -
1.14249926
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## 165 2011-06-14      NO    YES        1  0.58075033  0.5175699665 -
0.85156790
## 166 2011-06-15      NO    YES        1  0.75067501  0.6727008929 -
0.94854502
## 167 2011-06-16      NO    YES        2  0.69403345  0.6209905841
0.31215754
## 168 2011-06-17      NO    YES        1  0.75067501  0.7244112017
1.28192875
## 169 2011-06-18      NO    NO         1  1.26044905  1.2415142899 -
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## 170 2011-06-19      NO    NO         2  1.14716593  1.1380936722
0.27983184
## 171 2011-06-20      NO    YES        2  0.80731657  0.7244112017
0.95867168
## 172 2011-06-21      NO    YES        2  1.03388281  1.0346730546
0.95867168
## 173 2011-06-22      NO    YES        1  1.31709061  1.5000658339
0.82936885
## 174 2011-06-23      NO    YES        2  1.26044905  1.3449349075
0.44146037
## 175 2011-06-24      NO    YES        1  1.20380749  1.1380936722 -
0.98087073
## 176 2011-06-25      NO    NO         1  1.14716593  1.0346730546 -
0.98087073
## 177 2011-06-26      NO    NO         1  1.14716593  1.0346730546 -
0.72226507
## 178 2011-06-27      NO    YES        2  1.14716593  1.1380936722
0.11820330
## 179 2011-06-28      NO    YES        1  1.37373217  1.3966452163
0.31215754
## 180 2011-06-29      NO    YES        1  1.26044905  1.1380936722 -
1.36877921
## 181 2011-06-30      NO    YES        1  1.14716593  1.0346730546 -
1.36877921
## 182 2011-07-01      NO    YES        1  1.14716593  1.0346730546 -
1.36877921
## 183 2011-07-02      NO    NO         1  1.37373217  1.2932245987 -
1.01319644
## 184 2011-07-03      NO    NO         2  1.09052437  1.0863833634
0.44146037
## 185 2011-07-04     YES    YES        2  1.37373217  1.4483555251 -
0.07575094
## 186 2011-07-05      NO    YES        1  1.48701529  1.4483555251 -
0.07575094
## 187 2011-07-06      NO    YES        1  1.26044905  1.3449349075
0.70006603
## 188 2011-07-07      NO    YES        1  1.37373217  1.5000658339 -
0.07575094
## 189 2011-07-08      NO    YES        2  1.14716593  1.1380936722
0.99099739
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## 190 2011-07-09    NO    NO         1  1.37373217  1.3449349075  -
0.33435659
## 191 2011-07-10    NO    NO         1  1.37373217  1.4483555251  -
0.14040235
## 192 2011-07-11    NO    YES        1  1.31709061  1.3966452163  -
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## 193 2011-07-12    NO    YES        1  1.71358153  1.6551967604  -
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## 194 2011-07-13    NO    YES        1  1.37373217  1.3449349075  -
0.33435659
## 195 2011-07-14    NO    YES        1  0.97724125  0.8795421282  -
0.94854502
## 196 2011-07-15    NO    YES        1  0.92059969  0.8278318193  -
0.49598513
## 197 2011-07-16    NO    NO         1  1.14716593  1.1380936722  -
0.46365942
## 198 2011-07-17    NO    NO         1  1.31709061  1.3449349075  -
0.20505377
## 199 2011-07-18    NO    YES        1  1.43037373  1.5000658339
0.18285472
## 200 2011-07-19    NO    YES        1  1.48701529  1.7586173780
0.18285472
## 201 2011-07-20    NO    YES        1  1.48701529  1.8620379956
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## 202 2011-07-21    NO    YES        2  1.82686465  2.5859823191
0.50611178
## 203 2011-07-22    NO    YES        1  1.94014777  2.2757204662  -
0.36668230
## 204 2011-07-23    NO    NO         1  1.82686465  2.0688792309  -
0.72226507
## 205 2011-07-24    NO    NO         1  1.82686465  2.0688792309  -
0.52831083
## 206 2011-07-25    NO    YES        1  1.37373217  1.5517761428
1.02332309
## 207 2011-07-26    NO    YES        1  1.54365685  1.5000658339  -
1.01319644
## 208 2011-07-27    NO    YES        1  1.54365685  1.3966452163  -
1.27180209
## 209 2011-07-28    NO    YES        1  1.60029841  1.8620379956  -
0.46365942
## 210 2011-07-29    NO    YES        1  1.94014777  2.0171689221  -
1.07784785
## 211 2011-07-30    NO    NO         1  1.65693997  1.6551967604  -
1.01319644
## 212 2011-07-31    NO    NO         1  1.60029841  1.6551967604  -
0.52831083
## 213 2011-08-01    NO    YES        1  1.37373217  1.3449349075  -
0.43133371
## 214 2011-08-02    NO    YES        1  1.71358153  1.6551967604  -
1.01319644
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## 215 2011-08-03    NO    YES           2   1.37373217   1.3449349075  -
0.33435659
## 216 2011-08-04    NO    YES           2   1.14716593   1.1380936722
0.70006603
## 217 2011-08-05    NO    YES           1   1.14716593   1.1380936722
0.11820330
## 218 2011-08-06    NO    NO            2   1.26044905   1.4483555251
0.95867168
## 219 2011-08-07    NO    NO            1   1.26044905   1.3449349075
1.34658016
## 220 2011-08-08    NO    YES           1   1.48701529   1.5517761428  -
0.43133371
## 221 2011-08-09    NO    YES           1   1.60029841   1.5000658339  -
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## 222 2011-08-10    NO    YES           1   1.48701529   1.3449349075  -
1.56273345
## 223 2011-08-11    NO    YES           1   1.20380749   1.0863833634  -
1.36877921
## 224 2011-08-12    NO    YES           1   1.20380749   1.0863833634  -
1.36877921
## 225 2011-08-13    NO    NO            2   1.03388281   1.0346730546
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## 226 2011-08-14    NO    NO            2   0.92059969   0.9312524370
1.31425446
## 227 2011-08-15    NO    YES           1   0.92059969   0.8278318193
0.37680896
## 228 2011-08-16    NO    YES           1   1.14716593   1.1380936722  -
0.33435659
## 229 2011-08-17    NO    YES           1   1.31709061   1.2415142899  -
0.43133371
## 230 2011-08-18    NO    YES           1   1.03388281   0.9829627458
0.27983184
## 231 2011-08-19    NO    YES           2   0.86395813   0.8795421282
1.12030021
## 232 2011-08-20    NO    NO            1   1.20380749   1.1898039810
0.24750613
## 233 2011-08-21    NO    NO            1   1.14716593   1.2415142899
1.02332309
## 234 2011-08-22    NO    YES           1   1.09052437   1.0346730546  -
1.53040775
## 235 2011-08-23    NO    YES           1   0.75067501   0.6727008929  -
0.88389361
## 236 2011-08-24    NO    YES           1   1.14716593   1.1380936722  -
0.26970518
## 237 2011-08-25    NO    YES           2   1.03388281   0.9312524370
0.95867168
## 238 2011-08-26    NO    YES           1   1.26044905   1.4483555251
1.02332309
## 239 2011-08-27    NO    NO            2   0.92059969   0.9312524370
1.34658016
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## 240 2011-08-28    NO    NO    1  0.92059969  0.8278318193   0.11820330
## 241 2011-08-29    NO   YES    1  0.75067501  0.6727008929  -0.65761366
## 242 2011-08-30    NO   YES    1  0.86395813  0.7761215105  -0.62528795
## 243 2011-08-31    NO   YES    1  0.92059969  0.8278318193  -0.14040235
## 244 2011-09-01    NO   YES    1  0.92059969  0.8278318193  -0.23737947
## 245 2011-09-02    NO   YES    2  0.80731657  0.7244112017   0.70006603
## 246 2011-09-03    NO    NO    1  0.92059969  0.8795421282   0.44146037
## 247 2011-09-04    NO    NO    1  1.26044905  1.3449349075   0.70006603
## 248 2011-09-05   YES   YES    2  0.97724125  0.9312524370   0.82936885
## 249 2011-09-06    NO   YES    3  0.24090097  0.2073081136   1.60518582
## 250 2011-09-07    NO   YES    3  0.58075033  0.5175699665   1.99309430
## 251 2011-09-08    NO   YES    3  0.69403345  0.7244112017   1.99309430
## 252 2011-09-09    NO   YES    2  0.69403345  0.7244112017   1.99309430
## 253 2011-09-10    NO    NO    1  0.80731657  0.7244112017   0.95867168
## 254 2011-09-11    NO    NO    1  0.80731657  0.7244112017   0.63541461
## 255 2011-09-12    NO   YES    1  0.80731657  0.7244112017   0.53843749
## 256 2011-09-13    NO   YES    1  0.80731657  0.7244112017   0.82936885
## 257 2011-09-14    NO   YES    1  0.92059969  0.8278318193   0.40913466
## 258 2011-09-15    NO   YES    2  0.63739189  0.5692802753   0.37680896
## 259 2011-09-16    NO   YES    2  0.01433473  0.0004668783  -0.39900801
## 260 2011-09-17    NO    NO    2  0.01433473  0.0004668783   0.57076320
## 261 2011-09-18    NO    NO    1  0.18425941  0.1555978047   0.31215754
## 262 2011-09-19    NO   YES    2  0.35418409  0.3107287312   0.31215754
## 263 2011-09-20    NO   YES    2  0.35418409  0.3107287312   1.60518582
## 264 2011-09-21    NO   YES    2  0.63739189  0.5692802753   1.99309430
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## 265 2011-09-22    NO    YES    2  0.69403345  0.7244112017
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## 266 2011-09-23    NO    YES    2  0.69403345  0.7244112017
1.99309430
## 267 2011-09-24    NO    NO     2  0.69403345  0.6209905841
1.60518582
## 268 2011-09-25    NO    NO     2  0.75067501  0.7244112017
1.44355728
## 269 2011-09-26    NO    YES    2  0.80731657  0.8278318193
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## 270 2011-09-27    NO    YES    2  0.75067501  0.7761215105
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## 271 2011-09-28    NO    YES    2  0.58075033  0.5175699665
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## 272 2011-09-29    NO    YES    1  0.58075033  0.5175699665
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## 273 2011-09-30    NO    YES    1  0.24090097  0.2073081136 -
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## 274 2011-10-01    NO    NO     2 -0.55208087 -0.5166362098
0.89402027
## 275 2011-10-02    NO    NO     2 -0.77864711 -1.0337392980
1.21727733
## 276 2011-10-03    NO    YES    2 -0.55208087 -0.5166362098
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## 277 2011-10-04    NO    YES    1 -0.04230683 -0.0512434305
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## 278 2011-10-05    NO    YES    1  0.12761785  0.1038874959
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## 279 2011-10-06    NO    YES    1 -0.04230683 -0.0512434305 -
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## 280 2011-10-07    NO    YES    1  0.01433473  0.0004668783
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## 281 2011-10-08    NO    NO     1  0.07097629  0.0521771871
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## 282 2011-10-09    NO    NO     1  0.18425941  0.1555978047
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## 283 2011-10-10    YES   YES    1  0.35418409  0.3107287312
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## 284 2011-10-11    NO    YES    2  0.46746721  0.4141493488
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## 285 2011-10-12    NO    YES    3  0.24090097  0.2073081136
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## 286 2011-10-13    NO    YES    2  0.46746721  0.4141493488
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## 287 2011-10-14    NO    YES    2  0.35418409  0.3107287312
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## 288 2011-10-15    NO    NO     1  0.01433473  0.0004668783 -
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## 289 2011-10-16    NO    NO     1  0.24090097  0.2073081136 -
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## 290 2011-10-17    NO    YES    1  0.24090097  0.2073081136 -
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## 291 2011-10-18    NO    YES    2  0.18425941  0.1555978047
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## 292 2011-10-19    NO    YES    3  0.18425941  0.1555978047
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## 293 2011-10-20    NO    YES    1 -0.09894839 -0.1029537393 -
0.33435659
## 294 2011-10-21    NO    YES    1 -0.43879775 -0.4132155922 -
0.43133371
## 295 2011-10-22    NO    NO     1 -0.49543931 -0.4649259010 -
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## 296 2011-10-23    NO    NO     1 -0.43879775 -0.4132155922
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## 297 2011-10-24    NO    YES    1 -0.21223151 -0.2063743570
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## 298 2011-10-25    NO    YES    1 -0.21223151 -0.2063743570
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## 299 2011-10-26    NO    YES    2 -0.04230683 -0.0512434305
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## 300 2011-10-27    NO    YES    2 -0.09894839 -0.1029537393
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## 301 2011-10-28    NO    YES    2 -0.94857179 -1.1371599156 -
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## 302 2011-10-29    NO    NO     3 -1.34506271 -1.4991320773
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## 303 2011-10-30    NO    NO     1 -1.06185491 -1.0337392980
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## 304 2011-10-31    NO    YES    1 -0.89193023 -1.0337392980
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## 305 2011-11-01    NO    YES    1 -0.66536399 -0.6200568275
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## 306 2011-11-02    NO    YES    1 -0.72200555 -0.7751877539
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## 307 2011-11-03    NO    YES    1 -0.55208087 -0.5166362098
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## 308 2011-11-04    NO    YES    2 -0.55208087 -0.5166362098 -
0.14040235
## 309 2011-11-05    NO    NO     1 -1.00521335 -1.1371599156 -
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## 310 2011-11-06    NO    NO     1 -0.77864711 -0.8268980627
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## 311 2011-11-07    NO    YES    1 -0.77864711 -0.8268980627
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## 312 2011-11-08    NO    YES    1 -0.66536399 -0.6200568275
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## 313 2011-11-09    NO    YES    1 -0.55208087 -0.5166362098
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## 314 2011-11-10    NO    YES    2 -0.77864711 -0.9303186804
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## 315 2011-11-11    YES    YES        1 -1.00521335 -1.2405805333 -
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## 316 2011-11-12     NO     NO        1 -0.55208087 -0.5166362098 -
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## 317 2011-11-13     NO     NO        1 -0.21223151 -0.2063743570 -
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## 318 2011-11-14     NO    YES        1  0.35418409  0.3107287312 -
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## 319 2011-11-15     NO    YES        2  0.24090097  0.2073081136
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## 320 2011-11-16     NO    YES        3 -0.21223151 -0.2063743570
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## 321 2011-11-17     NO    YES        2 -0.89193023 -1.2405805333 -
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## 322 2011-11-18     NO    YES        1 -1.34506271 -1.4474217685 -
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## 323 2011-11-19     NO     NO        1 -0.77864711 -0.8786083716 -
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## 324 2011-11-20     NO     NO        2 -0.21223151 -0.2063743570
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## 325 2011-11-21     NO    YES        3 -0.32551463 -0.3097949746
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## 326 2011-11-22     NO    YES        3 -0.49543931 -0.4649259010
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## 327 2011-11-23     NO    YES        2 -0.32551463 -0.3097949746
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## 328 2011-11-24    YES    YES        1 -0.77864711 -0.9303186804 -
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## 329 2011-11-25     NO    YES        1 -0.83528867 -0.8786083716
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## 330 2011-11-26     NO     NO        1 -0.72200555 -0.6717671363
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## 331 2011-11-27     NO     NO        1 -0.09894839 -0.1029537393
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## 332 2011-11-28     NO    YES        1  0.12761785  0.1038874959
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## 333 2011-11-29     NO    YES        2 -0.43879775 -0.4132155922
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## 334 2011-11-30     NO    YES        1 -1.00521335 -1.2405805333 -
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## 335 2011-12-01     NO    YES        1 -1.11849647 -1.2405805333 -
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## 336 2011-12-02     NO    YES        1 -1.00521335 -1.1371599156 -
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## 337 2011-12-03     NO     NO        1 -1.11849647 -1.1888702244
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## 338 2011-12-04     NO     NO        1 -0.89193023 -0.9303186804
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## 339 2011-12-05     NO    YES        2 -0.43879775 -0.4132155922
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## 340 2011-12-06      NO      YES        3 -0.21223151 -0.2063743570
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## 341 2011-12-07      NO      YES        3 -0.32551463 -0.3097949746
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## 342 2011-12-08      NO      YES        1 -1.34506271 -1.4474217685 -
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## 343 2011-12-09      NO      YES        1 -1.17513803 -1.1888702244
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## 345 2011-12-11      NO       NO        1 -1.57162895 -1.3440011509 -
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## 346 2011-12-12      NO      YES        1 -1.40170427 -1.2405805333
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## 347 2011-12-13      NO      YES        1 -1.11849647 -1.2405805333 -
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## 348 2011-12-14      NO      YES        2 -1.00521335 -1.0337392980
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## 349 2011-12-15      NO      YES        2 -0.21223151 -0.2063743570
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## 350 2011-12-16      NO      YES        2 -0.89193023 -1.1371599156 -
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## 351 2011-12-17      NO       NO        2 -1.34506271 -1.5508423862 -
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## 352 2011-12-18      NO       NO        1 -1.57162895 -1.4991320773 -
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## 353 2011-12-19      NO      YES        1 -1.00521335 -1.1371599156 -
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## 354 2011-12-20      NO      YES        2 -0.72200555 -0.7234774451 -
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## 355 2011-12-21      NO      YES        2 -0.32551463 -0.3097949746
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## 356 2011-12-22      NO      YES        2 -0.32551463 -0.3097949746
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## 357 2011-12-23      NO      YES        1 -0.66536399 -0.8268980627
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## 358 2011-12-24      NO       NO        1 -1.11849647 -1.2405805333 -
0.56063654
## 359 2011-12-25      NO       NO        1 -1.28842115 -1.4474217685
0.47378608
## 360 2011-12-26     YES      YES        1 -0.89193023 -1.1371599156 -
1.11017356
## 361 2011-12-27      NO      YES        2 -1.00521335 -1.0854496068
1.18495163
## 362 2011-12-28      NO      YES        1 -1.00521335 -1.3440011509 -
1.11017356
## 363 2011-12-29      NO      YES        1 -1.28842115 -1.3440011509 -
0.30203089
## 364 2011-12-30      NO      YES        1 -0.89193023 -1.1371599156
0.18285472
```

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## 365 2011-12-31    NO    NO       1 -0.55208087 -0.5166362098 -
0.07575094
## 366 2012-01-01    NO    NO       1 -0.55208087 -0.5166362098
0.11820330
## 367 2012-01-02   YES   YES       1 -1.34506271 -1.4474217685 -
1.72436199
## 368 2012-01-03    NO   YES       1 -1.57162895 -0.8268980627 -
1.33645350
## 369 2012-01-04    NO   YES       2 -1.57162895 -0.9303186804 -
1.33645350
## 370 2012-01-05    NO   YES       1 -1.40170427 -1.4474217685 -
0.46365942
## 371 2012-01-06    NO   YES       1 -0.77864711 -0.9303186804 -
0.85156790
## 372 2012-01-07    NO    NO       1 -0.60872243 -0.6717671363 -
1.17482497
## 373 2012-01-08    NO    NO       1 -1.00521335 -1.0854496068 -
0.91621932
## 374 2012-01-09    NO   YES       2 -1.57162895 -1.5508423862
0.44146037
## 375 2012-01-10    NO   YES       1 -1.34506271 -1.2405805333
1.15262592
## 376 2012-01-11    NO   YES       2 -1.00521335 -1.1371599156
1.54053440
## 377 2012-01-12    NO   YES       2 -0.66536399 -0.8786083716
0.89402027
## 378 2012-01-13    NO   YES       1 -1.34506271 -1.4474217685 -
1.11017356
## 379 2012-01-14    NO    NO       1 -1.57162895 -1.1371599156 -
1.04552214
## 380 2012-01-15    NO    NO       1 -1.68491207 -1.1371599156 -
1.30412780
## 381 2012-01-16   YES   YES       1 -1.34506271 -1.4474217685 -
0.59296225
## 382 2012-01-17    NO   YES       2 -0.49543931 -0.6200568275
0.70006603
## 383 2012-01-18    NO   YES       1 -1.11849647 -1.3957114597 -
1.36877921
## 384 2012-01-19    NO   YES       1 -1.45834583 -1.4474217685 -
0.98087073
## 385 2012-01-20    NO   YES       2 -1.57162895 -1.4474217685 -
1.62738487
## 386 2012-01-21    NO    NO       2 -1.68491207 -1.1371599156
1.15262592
## 387 2012-01-22    NO    NO       2 -1.68491207 -1.1371599156
1.08797451
## 388 2012-01-23    NO   YES       2 -1.57162895 -1.5508423862
1.92844289
## 389 2012-01-24    NO   YES       1 -1.00521335 -1.0337392980
1.54053440
```

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## 390 2012-01-25    NO    YES        1 -1.17513803 -1.1371599156
0.18285472
## 391 2012-01-26    NO    YES        2 -0.66536399 -0.6717671363
1.02332309
## 392 2012-01-27    NO    YES        2 -0.43879775 -0.4132155922 -
0.39900801
## 393 2012-01-28    NO    NO         1 -1.11849647 -1.2405805333 -
0.62528795
## 394 2012-01-29    NO    NO         1 -1.11849647 -1.3440011509 -
2.24157330
## 395 2012-01-30    NO    YES        1 -1.28842115 -1.3440011509 -
1.30412780
## 396 2012-01-31    NO    YES        1 -0.43879775 -0.4132155922 -
1.53040775
## 397 2012-02-01    NO    YES        1 -0.21223151 -0.2063743570 -
0.72226507
## 398 2012-02-02    NO    YES        2 -0.55208087 -0.5166362098
0.24750613
## 399 2012-02-03    NO    YES        1 -1.06185491 -1.2922908421 -
0.65761366
## 400 2012-02-04    NO    NO         2 -1.45834583 -1.4474217685
1.15262592
## 401 2012-02-05    NO    NO         2 -1.34506271 -1.5508423862
0.11820330
## 402 2012-02-06    NO    YES        1 -1.11849647 -1.2405805333
0.18285472
## 403 2012-02-07    NO    YES        1 -0.94857179 -0.9820289892 -
1.01319644
## 404 2012-02-08    NO    YES        2 -1.45834583 -1.5508423862
0.44146037
## 405 2012-02-09    NO    YES        1 -1.23177959 -1.2405805333 -
0.65761366
## 406 2012-02-10    NO    YES        2 -1.11849647 -1.2405805333 -
0.46365942
## 407 2012-02-11    NO    NO         3 -1.57162895 -1.5508423862
1.15262592
## 408 2012-02-12    NO    NO         1 -1.57162895 -0.8268980627 -
1.30412780
## 409 2012-02-13    NO    YES        1 -1.34506271 -1.0854496068 -
1.11017356
## 410 2012-02-14    NO    YES        2 -0.94857179 -0.9820289892 -
0.85156790
## 411 2012-02-15    NO    YES        1 -0.89193023 -1.0337392980 -
0.59296225
## 412 2012-02-16    NO    YES        2 -1.00521335 -1.0337392980
0.82936885
## 413 2012-02-17    NO    YES        1 -0.77864711 -0.9820289892 -
1.14249926
## 414 2012-02-18    NO    NO         1 -0.83528867 -1.0854496068 -
1.23947638
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## 415 2012-02-19    NO    NO         2 -1.28842115 -1.4474217685 -
0.72226507
## 416 2012-02-20    YES   YES        1 -1.34506271 -1.2405805333 -
0.98087073
## 417 2012-02-21    NO    YES        1 -1.00521335 -1.2922908421
0.11820330
## 418 2012-02-22    NO    YES        1 -0.38215619 -0.3615052834 -
0.39900801
## 419 2012-02-23    NO    YES        1 -0.32551463 -0.3097949746 -
0.52831083
## 420 2012-02-24    NO    YES        2 -0.55208087 -0.5166362098
1.05564880
## 421 2012-02-25    NO    NO         1 -1.11849647 -1.4474217685 -
1.49808204
## 422 2012-02-26    NO    NO         1 -1.28842115 -1.3440011509 -
1.36877921
## 423 2012-02-27    NO    YES        1 -0.55208087 -0.5166362098 -
1.17482497
## 424 2012-02-28    NO    YES        1 -0.83528867 -0.9303186804 -
1.53040775
## 425 2012-02-29    NO    YES        2 -0.77864711 -1.0337392980
1.54053440
## 426 2012-03-01    NO    YES        1 -0.21223151 -0.2063743570 -
0.85156790
## 427 2012-03-02    NO    YES        2 -0.77864711 -0.9303186804
0.50611178
## 428 2012-03-03    NO    NO         2 -0.55208087 -0.5166362098 -
0.78691649
## 429 2012-03-04    NO    NO         1 -1.00521335 -1.3957114597 -
1.33645350
## 430 2012-03-05    NO    YES        1 -1.45834583 -1.4991320773 -
0.56063654
## 431 2012-03-06    NO    YES        1 -1.23177959 -1.2405805333 -
0.94854502
## 432 2012-03-07    NO    YES        1 -0.32551463 -0.3097949746 -
0.39900801
## 433 2012-03-08    NO    YES        1  0.35418409  0.3107287312 -
0.78691649
## 434 2012-03-09    NO    YES        2 -0.66536399 -0.9303186804 -
1.88599052
## 435 2012-03-10    NO    NO         1 -1.34506271 -1.3440011509 -
1.43343062
## 436 2012-03-11    NO    NO         1 -0.60872243 -0.6200568275 -
0.85156790
## 437 2012-03-12    NO    YES        1  0.07097629  0.0521771871 -
0.85156790
## 438 2012-03-13    NO    YES        1  0.29754253  0.2590184224 -
0.20505377
## 439 2012-03-14    NO    YES        1  0.35418409  0.3107287312 -
1.11017356
```

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## 440 2012-03-15    NO    YES    1  0.12761785   0.1038874959 -
0.10807664
## 441 2012-03-16    NO    YES    2 -0.32551463  -0.3097949746
1.60518582
## 442 2012-03-17    NO    NO     2  0.12761785   0.1038874959
0.89402027
## 443 2012-03-18    NO    NO     2 -0.21223151  -0.2063743570
1.21727733
## 444 2012-03-19    NO    YES    1  0.35418409   0.3107287312
0.60308891
## 445 2012-03-20    NO    YES    1  0.24090097   0.2073081136
1.28192875
## 446 2012-03-21    NO    YES    2  0.12761785   0.1038874959
1.28192875
## 447 2012-03-22    NO    YES    1  0.41082565   0.3624390400
1.12030021
## 448 2012-03-23    NO    YES    2  0.58075033   0.5175699665
0.37680896
## 449 2012-03-24    NO    NO     2  0.01433473   0.0004668783
1.99309430
## 450 2012-03-25    NO    NO     2 -0.43879775  -0.4132155922
1.60518582
## 451 2012-03-26    NO    YES    1 -0.26887307  -0.2580846658 -
1.98296764
## 452 2012-03-27    NO    YES    1 -1.00521335  -1.1371599156 -
2.07994476
## 453 2012-03-28    NO    YES    1  0.24090097   0.2073081136 -
1.11017356
## 454 2012-03-29    NO    YES    1 -0.04230683  -0.0512434305 -
1.23947638
## 455 2012-03-30    NO    YES    2 -0.72200555  -0.7751877539 -
0.36668230
## 456 2012-03-31    NO    NO     2 -0.55208087  -0.5166362098
0.82936885
## 457 2012-04-01    NO    NO     2 -0.38215619  -0.3615052834
0.53843749
## 458 2012-04-02    NO    YES    1 -0.32551463  -0.3097949746 -
1.23947638
## 459 2012-04-03    NO    YES    1 -0.04230683  -0.0512434305 -
1.36877921
## 460 2012-04-04    NO    YES    1  0.35418409   0.3107287312 -
1.11017356
## 461 2012-04-05    NO    YES    1 -0.43879775  -0.4132155922 -
1.62738487
## 462 2012-04-06    NO    YES    1 -0.49543931  -0.4649259010 -
1.82133911
## 463 2012-04-07    NO    NO     1 -0.26887307  -0.2580846658 -
2.56483036
## 464 2012-04-08    NO    NO     1  0.01433473   0.0004668783 -
2.43552754
```

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## 465 2012-04-09     NO    YES        1 -0.15558995 -0.1546640481 -
2.07994476
## 466 2012-04-10     NO    YES        1 -0.38215619 -0.3615052834 -
1.65971057
## 467 2012-04-11     NO    YES        1 -0.89193023 -1.1371599156 -
0.91621932
## 468 2012-04-12     NO    YES        1 -0.43879775 -0.4132155922 -
1.53040775
## 469 2012-04-13     NO    YES        1 -0.32551463 -0.3097949746 -
1.53040775
## 470 2012-04-14     NO    NO         1  0.24090097  0.2073081136 -
0.72226507
## 471 2012-04-15     NO    NO         1  0.75067501  0.6727008929 -
0.78691649
## 472 2012-04-16    YES    YES        1  0.97724125  0.8795421282 -
0.49598513
## 473 2012-04-17     NO    YES        1  0.58075033  0.5175699665 -
1.98296764
## 474 2012-04-18     NO    YES        2 -0.21223151 -0.2063743570 -
0.52831083
## 475 2012-04-19     NO    YES        1  0.07097629  0.0521771871 -
0.14040235
## 476 2012-04-20     NO    YES        1  0.18425941  0.1555978047
0.47378608
## 477 2012-04-21     NO    NO         1  0.12761785  0.1038874959
0.92634597
## 478 2012-04-22     NO    NO         3 -0.66536399 -0.9303186804
1.21727733
## 479 2012-04-23     NO    YES        2 -1.00521335 -1.2405805333
0.82936885
## 480 2012-04-24     NO    YES        1 -0.32551463 -0.3097949746 -
1.69203628
## 481 2012-04-25     NO    YES        1  0.07097629  0.0521771871 -
1.07784785
## 482 2012-04-26     NO    YES        2  0.01433473  0.0004668783
1.08797451
## 483 2012-04-27     NO    YES        1 -0.32551463 -0.3097949746 -
1.62738487
## 484 2012-04-28     NO    NO         2 -0.66536399 -0.7751877539 -
1.07784785
## 485 2012-04-29     NO    NO         1 -0.15558995 -0.1546640481 -
0.52831083
## 486 2012-04-30     NO    YES        2 -0.32551463 -0.3097949746 -
0.46365942
## 487 2012-05-01     NO    YES        2  0.75067501  0.6727008929
0.11820330
## 488 2012-05-02     NO    YES        1  0.35418409  0.3107287312
1.28192875
## 489 2012-05-03     NO    YES        2  0.46746721  0.4141493488
0.95867168
```

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## 490 2012-05-04    NO    YES    1  0.63739189  0.5692802753
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## 491 2012-05-05    NO    NO     2  0.58075033  0.5175699665
0.95867168
## 492 2012-05-06    NO    NO     2  0.29754253  0.2590184224
0.76471744
## 493 2012-05-07    NO    YES    2  0.24090097  0.2073081136 -
0.07575094
## 494 2012-05-08    NO    YES    2  0.58075033  0.5175699665
0.37680896
## 495 2012-05-09    NO    YES    2  0.35418409  0.3107287312
1.08797451
## 496 2012-05-10    NO    YES    1  0.01433473  0.0004668783 -
0.91621932
## 497 2012-05-11    NO    YES    1  0.29754253  0.2590184224 -
1.75668769
## 498 2012-05-12    NO    NO     1  0.41082565  0.3624390400 -
0.91621932
## 499 2012-05-13    NO    NO     1  0.69403345  0.6209905841 -
0.39900801
## 500 2012-05-14    NO    YES    2  0.46746721  0.4141493488
1.28192875
## 501 2012-05-15    NO    YES    2  0.63739189  0.5692802753
0.95867168
## 502 2012-05-16    NO    YES    1  0.80731657  0.7244112017
0.70006603
## 503 2012-05-17    NO    YES    1  0.58075033  0.5175699665 -
0.91621932
## 504 2012-05-18    NO    YES    1  0.46746721  0.4141493488 -
1.01319644
## 505 2012-05-19    NO    NO     1  0.63739189  0.5175699665 -
1.17482497
## 506 2012-05-20    NO    NO     1  0.80731657  0.7244112017 -
0.72226507
## 507 2012-05-21    NO    YES    2  0.58075033  0.5175699665
1.28192875
## 508 2012-05-22    NO    YES    2  0.69403345  0.6209905841
0.95867168
## 509 2012-05-23    NO    YES    2  0.69403345  0.6209905841
1.28192875
## 510 2012-05-24    NO    YES    1  0.80731657  0.7244112017
0.63541461
## 511 2012-05-25    NO    YES    1  0.97724125  0.9829627458
0.99099739
## 512 2012-05-26    NO    NO     1  1.14716593  1.1380936722
0.70006603
## 513 2012-05-27    NO    NO     1  0.92059969  0.8795421282
0.70006603
## 514 2012-05-28    YES   YES    1  1.26044905  1.3449349075
0.18285472
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## 515 2012-05-29     NO    YES     1  1.14716593  1.2415142899
0.44146037
## 516 2012-05-30     NO    YES     2  0.80731657  0.8278318193
0.37680896
## 517 2012-05-31     NO    YES     1  0.92059969  0.8278318193 -
1.04552214
## 518 2012-06-01     NO    YES     2  0.80731657  0.7244112017
0.95867168
## 519 2012-06-02     NO    NO      1  0.46746721  0.4141493488 -
0.91621932
## 520 2012-06-03     NO    NO      1  0.69403345  0.5175699665 -
1.17482497
## 521 2012-06-04     NO    YES     1  0.58075033  0.5175699665 -
1.07784785
## 522 2012-06-05     NO    YES     2  0.24090097  0.2073081136 -
0.46365942
## 523 2012-06-06     NO    YES     1  0.24090097  0.2073081136
0.31215754
## 524 2012-06-07     NO    YES     1  0.58075033  0.5175699665 -
0.88389361
## 525 2012-06-08     NO    YES     1  0.97724125  0.8795421282 -
1.20715068
## 526 2012-06-09     NO    NO      1  1.14716593  1.0863833634 -
0.81924220
## 527 2012-06-10     NO    NO      1  1.26044905  1.2415142899 -
0.33435659
## 528 2012-06-11     NO    YES     2  1.26044905  1.2415142899 -
0.33435659
## 529 2012-06-12     NO    YES     2  0.92059969  0.9312524370
1.60518582
## 530 2012-06-13     NO    YES     1  0.80731657  0.7244112017 -
0.75459078
## 531 2012-06-14     NO    YES     1  0.80731657  0.7244112017 -
0.39900801
## 532 2012-06-15     NO    YES     1  0.80731657  0.7244112017 -
0.65761366
## 533 2012-06-16     NO    NO      1  0.75067501  0.6727008929 -
0.75459078
## 534 2012-06-17     NO    NO      1  0.52410877  0.4658596576 -
0.30203089
## 535 2012-06-18     NO    YES     2  0.41082565  0.3624390400
0.95867168
## 536 2012-06-19     NO    YES     1  1.14716593  1.1898039810
0.70006603
## 537 2012-06-20     NO    YES     1  1.82686465  1.7586173780 -
0.72226507
## 538 2012-06-21     NO    YES     1  1.77022309  1.9654586133 -
0.62528795
## 539 2012-06-22     NO    YES     1  1.48701529  1.6551967604 -
0.33435659
```

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## 540 2012-06-23   NO    NO    1  1.37373217  1.2415142899  -1.14249926
## 541 2012-06-24   NO    NO    1  1.48701529  1.3449349075  -0.78691649
## 542 2012-06-25   NO    YES   1  1.14716593  1.1380936722  -1.17482497
## 543 2012-06-26   NO    YES   1  0.75067501  0.5692802753  -1.78901340
## 544 2012-06-27   NO    YES   1  1.20380749  1.0863833634  -1.62738487
## 545 2012-06-28   NO    YES   1  1.37373217  1.2415142899  -0.98087073
## 546 2012-06-29   NO    YES   1  1.94014777  2.3274307750  -0.72226507
## 547 2012-06-30   NO    NO    1  1.60029841  1.7586173780  -0.07575094
## 548 2012-07-01   NO    NO    1  1.82686465  1.7586173780  -1.23947638
## 549 2012-07-02   NO    YES   1  1.48701529  1.4483555251  -0.78691649
## 550 2012-07-03   NO    YES   1  1.43037373  1.4483555251  -0.56063654
## 551 2012-07-04   YES   YES   1  1.77022309  1.7069070692  -0.75459078
## 552 2012-07-05   NO    YES   1  1.94014777  2.0688792309  -1.01319644
## 553 2012-07-06   NO    YES   1  1.82686465  1.8103276868  -1.53040775
## 554 2012-07-07   NO    NO    1  2.05343089  2.3274307750  -1.07784785
## 555 2012-07-08   NO    NO    1  1.71358153  2.0688792309  -0.26970518
## 556 2012-07-09   NO    YES   2  1.14716593  1.2415142899   0.11820330
## 557 2012-07-10   NO    YES   2  1.14716593  1.1380936722   0.70006603
## 558 2012-07-11   NO    YES   1  1.26044905  1.2415142899  -0.33435659
## 559 2012-07-12   NO    YES   1  1.26044905  1.1380936722  -0.78691649
## 560 2012-07-13   NO    YES   2  1.37373217  1.2415142899  -0.98087073
## 561 2012-07-14   NO    NO    2  1.14716593  1.2415142899   0.70006603
## 562 2012-07-15   NO    NO    1  1.26044905  1.4483555251   1.02332309
## 563 2012-07-16   NO    YES   1  1.48701529  1.6034864516   0.05355189
## 564 2012-07-17   NO    YES   1  1.82686465  1.8620379956  -0.81924220
```

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## 565 2012-07-18       NO      YES         1  1.48701529  1.5517761428 -
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## 566 2012-07-19       NO      YES         1  1.48701529  1.5517761428 -
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## 567 2012-07-20       NO      YES         2  0.92059969  0.9312524370
1.31425446
## 568 2012-07-21       NO      NO          3  0.58075033  0.5175699665
1.60518582
## 569 2012-07-22       NO      NO          2  0.92059969  0.8278318193
0.70006603
## 570 2012-07-23       NO      YES         1  1.43037373  1.5517761428 -
0.07575094
## 571 2012-07-24       NO      YES         1  1.37373217  1.5000658339
0.05355189
## 572 2012-07-25       NO      YES         1  1.26044905  1.1380936722 -
1.43343062
## 573 2012-07-26       NO      YES         1  1.31709061  1.4483555251
0.15052901
## 574 2012-07-27       NO      YES         1  1.60029841  1.7586173780 -
0.26970518
## 575 2012-07-28       NO      NO          1  1.37373217  1.4483555251
0.18285472
## 576 2012-07-29       NO      NO          1  1.26044905  1.2932245987
0.15052901
## 577 2012-07-30       NO      YES         1  1.26044905  1.3449349075
0.44146037
## 578 2012-07-31       NO      YES         1  1.14716593  1.1898039810
0.57076320
## 579 2012-08-01       NO      YES         1  1.26044905  1.3449349075
0.44146037
## 580 2012-08-02       NO      YES         1  1.48701529  1.6551967604
0.18285472
## 581 2012-08-03       NO      YES         2  1.48701529  1.7069070692
0.18285472
## 582 2012-08-04       NO      NO          1  1.65693997  1.9137483045 -
0.04342523
## 583 2012-08-05       NO      NO          1  1.37373217  1.5517761428
0.44146037
## 584 2012-08-06       NO      YES         2  1.37373217  1.5517761428
0.44146037
## 585 2012-08-07       NO      YES         2  1.26044905  1.4483555251
0.44146037
## 586 2012-08-08       NO      YES         2  1.37373217  1.5000658339
0.18285472
## 587 2012-08-09       NO      YES         1  1.26044905  1.3449349075 -
0.33435659
## 588 2012-08-10       NO      YES         2  1.26044905  1.3449349075
0.44146037
## 589 2012-08-11       NO      NO          2  0.92059969  0.9312524370
0.95867168
```

```
## 590 2012-08-12    NO    NO       1  1.14716593  1.0346730546 -
0.78691649
## 591 2012-08-13    NO    YES      1  1.31709061  1.2932245987 -
0.20505377
## 592 2012-08-14    NO    YES      1  1.26044905  1.3449349075
0.44146037
## 593 2012-08-15    NO    YES      1  1.14716593  1.1380936722 -
0.14040235
## 594 2012-08-16    NO    YES      1  1.31709061  1.2415142899 -
0.88389361
## 595 2012-08-17    NO    YES      1  1.09052437  1.0346730546 -
0.33435659
## 596 2012-08-18    NO    NO       1  0.92059969  0.8278318193 -
0.14040235
## 597 2012-08-19    NO    NO       2  0.80731657  0.7244112017
0.63541461
## 598 2012-08-20    NO    YES      2  0.69403345  0.6209905841
0.95867168
## 599 2012-08-21    NO    YES      1  0.80731657  0.7244112017
0.70006603
## 600 2012-08-22    NO    YES      1  0.80731657  0.7761215105
0.70006603
## 601 2012-08-23    NO    YES      1  1.14716593  1.1380936722 -
0.14040235
## 602 2012-08-24    NO    YES      2  1.14716593  1.1380936722 -
0.10807664
## 603 2012-08-25    NO    NO       2  0.92059969  0.8278318193
0.70006603
## 604 2012-08-26    NO    NO       2  0.80731657  0.8278318193
1.66983723
## 605 2012-08-27    NO    YES      1  1.26044905  1.3449349075
0.70006603
## 606 2012-08-28    NO    YES      1  1.20380749  1.1898039810 -
0.46365942
## 607 2012-08-29    NO    YES      1  0.97724125  0.8795421282 -
0.59296225
## 608 2012-08-30    NO    YES      1  1.20380749  1.1898039810 -
0.10807664
## 609 2012-08-31    NO    YES      1  1.48701529  1.5517761428 -
0.07575094
## 610 2012-09-01    NO    NO       2  1.48701529  1.5517761428 -
0.20505377
## 611 2012-09-02    NO    NO       2  1.14716593  1.1898039810
1.34658016
## 612 2012-09-03    YES   YES      1  1.14716593  1.2415142899
1.28192875
## 613 2012-09-04    NO    YES      1  1.37373217  1.5517761428
0.70006603
## 614 2012-09-05    NO    YES      1  1.26044905  1.4483555251
0.70006603
```

```
## 615 2012-09-06     NO     YES      2   1.14716593   1.2415142899
1.34658016
## 616 2012-09-07     NO     YES      1   1.14716593   1.2415142899
0.70006603
## 617 2012-09-08     NO     NO       2   0.92059969   0.9312524370
1.60518582
## 618 2012-09-09     NO     NO       1   0.63739189   0.5175699665 -
0.81924220
## 619 2012-09-10     NO     YES      1   0.58075033   0.5175699665 -
0.85156790
## 620 2012-09-11     NO     YES      1   0.41082565   0.3624390400 -
0.36668230
## 621 2012-09-12     NO     YES      1   0.58075033   0.5175699665 -
0.04342523
## 622 2012-09-13     NO     YES      1   0.63739189   0.5692802753
0.24750613
## 623 2012-09-14     NO     YES      1   0.69403345   0.6209905841
0.63541461
## 624 2012-09-15     NO     NO       1   0.58075033   0.5175699665 -
1.11017356
## 625 2012-09-16     NO     NO       1   0.52410877   0.4658596576 -
0.30203089
## 626 2012-09-17     NO     YES      2   0.69403345   0.6209905841
0.63541461
## 627 2012-09-18     NO     YES      2   0.69403345   0.7244112017
1.60518582
## 628 2012-09-19     NO     YES      1   0.24090097   0.2073081136 -
0.26970518
## 629 2012-09-20     NO     YES      1   0.35418409   0.3107287312
0.02122618
## 630 2012-09-21     NO     YES      1   0.58075033   0.5175699665
0.37680896
## 631 2012-09-22     NO     NO       1   0.80731657   0.7244112017 -
0.33435659
## 632 2012-09-23     NO     NO       1   0.12761785   0.1038874959 -
1.01319644
## 633 2012-09-24     NO     YES      1   0.07097629   0.0521771871 -
0.72226507
## 634 2012-09-25     NO     YES      1   0.58075033   0.5175699665 -
0.39900801
## 635 2012-09-26     NO     YES      1   0.69403345   0.6209905841
0.05355189
## 636 2012-09-27     NO     YES      2   0.58075033   0.5175699665
0.95867168
## 637 2012-09-28     NO     YES      2   0.68270514   0.6727008929
0.35094839
## 638 2012-09-29     NO     NO       1   0.22957266   0.2383342989 -
0.48951999
## 639 2012-09-30     NO     NO       1   0.16160279   0.1866239900 -
0.34082173
```

```
## 640 2012-10-01      NO      YES         2  0.13894616   0.0935454342
0.12466844
## 641 2012-10-02      NO      YES         3  0.56942202   0.4451755341
1.70216294
## 642 2012-10-03      NO      YES         2  0.84130151   0.8485159429
1.28192875
## 643 2012-10-04      NO      YES         2  0.88661475   0.8174897576
0.65481004
## 644 2012-10-05      NO      YES         1  0.67137683   0.6416747076 -
0.04342523
## 645 2012-10-06      NO      NO          1  0.32019916   0.3314128547
0.18931986
## 646 2012-10-07      NO      NO          2 -0.48411100  -0.5062941481
0.64834489
## 647 2012-10-08      YES     YES         2 -0.65403568  -0.6510830128
0.55783292
## 648 2012-10-09      NO      YES         2 -0.34817125  -0.2787687893
0.90048541
## 649 2012-10-10      NO      YES         1  0.01433473   0.1245716195
0.41559981
## 650 2012-10-11      NO      YES         1 -0.33684294  -0.2787687893 -
1.13603412
## 651 2012-10-12      NO      YES         1 -0.33684294  -0.2477426040 -
0.59296225
## 652 2012-10-13      NO      NO          1 -0.59739412  -0.5580044569 -
0.85156790
## 653 2012-10-14      NO      NO          1  0.15027448   0.1555978047
0.02769132
## 654 2012-10-15      NO      YES         2  0.39949734   0.2176501753
0.54490263
## 655 2012-10-16      NO      YES         1 -0.16691826  -0.1650061099 -
0.47658970
## 656 2012-10-17      NO      YES         1 -0.21223151  -0.1339799246
0.33155297
## 657 2012-10-18      NO      YES         2  0.11628954   0.0935454342
0.62248433
## 658 2012-10-19      NO      YES         2  0.38816903   0.3314128547
1.22374248
## 659 2012-10-20      NO      NO          1 -0.06496345  -0.0719275540 -
0.38607772
## 660 2012-10-21      NO      NO          1 -0.18957488  -0.1650061099 -
0.78045135
## 661 2012-10-22      NO      YES         1 -0.03097852  -0.0202172452 -
0.50891541
## 662 2012-10-23      NO      YES         1  0.32019916   0.2176501753 -
0.01756467
## 663 2012-10-24      NO      YES         1  0.51278046   0.5899643988
0.01476104
## 664 2012-10-25      NO      YES         2  0.26355760   0.3520969782
1.17848649
```

```
## 665 2012-10-26     NO     YES     2  0.26355760  0.3314128547
1.17848649
## 666 2012-10-27     NO      NO     2  0.16160279  0.2176501753
0.58369348
## 667 2012-10-28     NO      NO     2 -0.13293332 -0.1650061099
0.39620438
## 668 2012-10-29     NO     YES     3 -0.59739412 -0.5580044569
1.37890587
## 669 2012-10-30     NO     YES     2 -1.08451153 -0.9613448657
1.45002242
## 670 2012-10-31     NO     YES     2 -0.80130373 -0.7338195069
0.35741353
## 671 2012-11-01     NO     YES     2 -0.74466217 -0.7648456922 -
0.34728688
## 672 2012-11-02     NO     YES     1 -0.80130373 -0.7338195069 -
0.70933479
## 673 2012-11-03     NO      NO     2 -0.86927360 -0.8165560010 -
0.85156790
## 674 2012-11-04     NO      NO     1 -0.98255672 -0.8786083716 -
0.58649711
## 675 2012-11-05     NO     YES     1 -1.02786997 -0.9613448657 -
0.87742847
## 676 2012-11-06     NO     YES     1 -1.22045128 -1.1371599156 -
0.37961258
## 677 2012-11-07     NO     YES     2 -1.15248140 -1.0751075451 -
0.48305484
## 678 2012-11-08     NO     YES     1 -0.84661698 -0.7027933216 -
1.84719967
## 679 2012-11-09     NO     YES     1 -0.76731880 -0.7338195069 -
0.47658970
## 680 2012-11-10     NO      NO     1 -0.60872243 -0.5580044569
0.11173816
## 681 2012-11-11     NO      NO     1 -0.41614112 -0.2477426040
0.18285472
## 682 2012-11-12    YES     YES     1 -0.03097852 -0.0409013688
0.71946145
## 683 2012-11-13     NO     YES     2 -0.91458685 -0.7338195069
0.43499523
## 684 2012-11-14     NO     YES     1 -1.18646634 -1.0751075451 -
0.46365942
## 685 2012-11-15     NO     YES     2 -0.99388504 -0.9406607421 -
0.08221608
## 686 2012-11-16     NO     YES     1 -0.86927360 -0.7338195069 -
0.67700909
## 687 2012-11-17     NO      NO     1 -0.97122841 -0.9096345568 -
0.53477598
## 688 2012-11-18     NO      NO     1 -0.86927360 -0.7958718775
0.42206495
## 689 2012-11-19     NO     YES     2 -0.67669230 -0.5890306422 -
0.01756467
```

```
## 690 2012-11-20     NO      YES         2 -0.69934892 -0.5580044569
0.38973924
## 691 2012-11-21     NO      YES         1 -0.81263204 -0.7027933216 -
0.12100693
## 692 2012-11-22    YES      YES         1 -0.90325854 -0.7648456922 -
0.30849603
## 693 2012-11-23     NO      YES         1 -0.69934892 -0.7027933216 -
0.47012456
## 694 2012-11-24     NO       NO         1 -1.27709284 -1.1061337303 -
1.42696548
## 695 2012-11-25     NO       NO         1 -1.43568920 -1.2819487803 -
0.92914960
## 696 2012-11-26     NO      YES         1 -1.01654166 -0.9613448657 -
0.61882281
## 697 2012-11-27     NO      YES         2 -1.17513803 -1.1371599156
1.09443965
## 698 2012-11-28     NO      YES         1 -1.14115309 -1.0233972362 -
0.86449818
## 699 2012-11-29     NO      YES         1 -1.00521335 -1.0854496068 -
1.07784785
## 700 2012-11-30     NO      YES         1 -1.57162895 -1.4474217685
0.82936885
## 701 2012-12-01     NO       NO         2 -1.15248140 -1.1371599156
1.21081219
## 702 2012-12-02     NO       NO         2 -0.43879775 -0.4132155922
1.21727733
## 703 2012-12-03     NO      YES         1 -0.04230683 -0.0512434305
0.60308891
## 704 2012-12-04     NO      YES         1 -0.09894839 -0.1029537393
0.31215754
## 705 2012-12-05     NO      YES         1 -0.32551463 -0.3097949746 -
1.04552214
## 706 2012-12-06     NO      YES         1 -1.45834583 -1.3957114597 -
0.72226507
## 707 2012-12-07     NO      YES         2 -0.94857179 -1.0854496068
0.82936885
## 708 2012-12-08     NO       NO         2 -0.66536399 -0.6717671363
1.99309430
## 709 2012-12-09     NO       NO         2 -0.55208087 -0.5166362098
1.60518582
## 710 2012-12-10     NO      YES         2 -0.32551463 -0.3097949746
1.99309430
## 711 2012-12-11     NO      YES         2 -0.89193023 -1.1371599156 -
0.20505377
## 712 2012-12-12     NO      YES         2 -1.11849647 -1.3440011509 -
0.52831083
## 713 2012-12-13     NO      YES         1 -1.23177959 -1.2405805333 -
0.65761366
## 714 2012-12-14     NO      YES         1 -1.23177959 -1.2405805333
0.44146037
```

```
## 715 2012-12-15      NO      NO         1 -0.77864711 -0.9303186804 -
0.07575094
## 716 2012-12-16      NO      NO         2 -0.77864711 -0.8268980627
1.54053440
## 717 2012-12-17      NO      YES        2 -0.55208087 -0.5166362098
1.79914006
## 718 2012-12-18      NO      YES        1 -0.49543931 -0.4649259010 -
0.07575094
## 719 2012-12-19      NO      YES        1 -1.00521335 -1.1371599156 -
0.07575094
## 720 2012-12-20      NO      YES        2 -0.89193023 -1.0337392980
0.50611178
## 721 2012-12-21      NO      YES        2 -1.00521335 -1.3440011509 -
1.17482497
## 722 2012-12-22      NO      NO         1 -1.34506271 -1.5508423862 -
1.17482497
## 723 2012-12-23      NO      NO         1 -1.45834583 -1.3440011509 -
0.78691649
## 724 2012-12-24      NO      YES        2 -1.45834583 -1.5508423862
1.08797451
## 725 2012-12-25     YES      YES        2 -1.17513803 -1.2922908421
0.66774032
## 726 2012-12-26      NO      YES        3 -1.51498739 -1.3440011509
1.54053440
## 727 2012-12-27      NO      YES        2 -1.45834583 -1.5508423862 -
0.20505377
## 728 2012-12-28      NO      YES        2 -1.45834583 -1.5508423862 -
0.20505377
## 729 2012-12-29      NO      NO         2 -1.45834583 -1.4474217685
0.76471744
## 730 2012-12-30      NO      NO         1 -1.34506271 -1.5508423862 -
0.78691649
## 731 2012-12-31      NO      YES        2 -1.45834583 -1.4474217685 -
0.26970518
##       WINDSPEED CASUAL REGISTERED COUNT      MONTH
## 1     0.75557339    331        654   985    January
## 2     0.75557339    131        670   801    January
## 3     0.93616826    120       1229  1349    January
## 4    -0.68918562    108       1454  1562    January
## 5     0.03319388     82       1518  1600    January
## 6    -1.23097025     88       1518  1606    January
## 7    -0.32799587    148       1362  1510    January
## 8     0.75557339     68        891   959    January
## 9     2.20033239     54        768   822    January
## 10    0.39438363     41       1280  1321    January
## 11   -1.05037537     43       1220  1263    January
## 12    1.65854777     25       1137  1162    January
## 13    1.29735801     38       1368  1406    January
## 14   -0.86978050     54       1367  1421    January
## 15   -0.14740099    222       1026  1248    January
```

```
## 16    0.39438363    251     953  1204     January
## 17    0.03319388    117     883  1000     January
## 18    0.21378876      9     674   683     January
## 19   -0.50859075     78    1572  1650     January
## 20    0.39438363     83    1844  1927     January
## 21    1.65854777     75    1468  1543     January
## 22   -0.32799587     93     888   981     January
## 23    0.39438363    150     836   986     January
## 24    0.03319388     86    1330  1416     January
## 25   -0.68918562    186    1799  1985     January
## 26    1.65854777     34     472   506     January
## 27   -0.14740099     15     416   431     January
## 28   -1.05037537     38    1129  1167     January
## 29   -0.68918562    123     975  1098     January
## 30   -2.31453951    140     956  1096     January
## 31    0.03319388     42    1459  1501     January
## 32   -2.31453951     47    1313  1360    February
## 33    0.57497851     72    1454  1526    February
## 34    1.29735801     61    1489  1550    February
## 35   -0.68918562     88    1620  1708    February
## 36   -0.50859075    100     905  1005    February
## 37   -1.05037537    354    1269  1623    February
## 38   -2.31453951    120    1592  1712    February
## 39    2.56152214     64    1466  1530    February
## 40   -0.14740099     53    1552  1605    February
## 41    0.39438363     47    1491  1538    February
## 42   -1.23097025    149    1597  1746    February
## 43   -0.50859075    288    1184  1472    February
## 44    1.29735801    397    1192  1589    February
## 45    2.92271190    208    1705  1913    February
## 46    0.75557339    140    1675  1815    February
## 47    0.39438363    218    1897  2115    February
## 48    0.39438363    259    2216  2475    February
## 49    0.57497851    579    2348  2927    February
## 50    4.00628115    532    1103  1635    February
## 51   -0.32799587    639    1173  1812    February
## 52    1.29735801    195     912  1107    February
## 53    0.75557339     74    1376  1450    February
## 54   -1.23097025    139    1778  1917    February
## 55    1.11676314    100    1707  1807    February
## 56    2.01973752    120    1341  1461    February
## 57    0.21378876    424    1545  1969    February
## 58   -0.68918562    694    1708  2402    February
## 59    1.20706058     81    1365  1446    February
## 60    0.21378876    137    1714  1851       March
## 61    1.20706058    231    1903  2134       March
## 62    0.03319388    123    1562  1685       March
## 63    0.03319388    214    1730  1944       March
## 64    1.20706058    640    1437  2077       March
## 65    1.47795289    114     491   605       March
```

```
## 66    2.38092727    244    1628  1872    March
## 67   -0.86978050    316    1817  2133    March
## 68    0.75557339    191    1700  1891    March
## 69    0.75557339     46     577   623    March
## 70    0.75557339    247    1730  1977    March
## 71    0.03319388    724    1408  2132    March
## 72    1.29735801    982    1435  2417    March
## 73   -0.68918562    359    1687  2046    March
## 74    0.03319388    289    1767  2056    March
## 75    0.03319388    321    1871  2192    March
## 76    0.39438363    424    2320  2744    March
## 77    0.39438363    884    2355  3239    March
## 78    2.20033239   1424    1693  3117    March
## 79    0.39438363   1047    1424  2471    March
## 80    1.20706058    401    1676  2077    March
## 81    0.57497851    460    2243  2703    March
## 82    0.39438363    203    1918  2121    March
## 83    0.39438363    166    1699  1865    March
## 84    0.75557339    300    1910  2210    March
## 85    0.03319388    981    1515  2496    March
## 86   -0.14740099    472    1221  1693    March
## 87    0.39438363    222    1806  2028    March
## 88    0.75557339    317    2108  2425    March
## 89    0.39438363    168    1368  1536    March
## 90    0.39438363    179    1506  1685    March
## 91    0.75557339    307    1920  2227    April
## 92   -0.32799587    898    1354  2252    April
## 93    0.03319388   1651    1598  3249    April
## 94    2.20033239    734    2381  3115    April
## 95    2.74211702    167    1628  1795    April
## 96    0.93616826    413    2395  2808    April
## 97    0.03319388    571    2570  3141    April
## 98    0.39438363    172    1299  1471    April
## 99   -0.68918562    879    1576  2455    April
## 100  -0.68918562   1188    1707  2895    April
## 101   1.20706058    855    2493  3348    April
## 102   1.11676314    257    1777  2034    April
## 103   0.75557339    209    1953  2162    April
## 104  -0.68918562    529    2738  3267    April
## 105   0.75557339    642    2484  3126    April
## 106   1.65854777    121     674   795    April
## 107   1.65854777   1558    2186  3744    April
## 108  -0.32799587    669    2760  3429    April
## 109  -0.32799587    409    2795  3204    April
## 110   0.75557339    613    3331  3944    April
## 111   1.83914264    745    3444  4189    April
## 112   0.39438363    177    1506  1683    April
## 113   0.39438363   1462    2574  4036    April
## 114   0.03319388   1710    2481  4191    April
## 115   0.39438363    773    3300  4073    April
```

```
## 116  1.65854777    678      3722  4400      April
## 117  1.11676314    547      3325  3872      April
## 118  1.65854777    569      3489  4058      April
## 119  1.11676314    878      3717  4595      April
## 120  0.39438363   1965      3347  5312      April
## 121 -1.05037537   1138      2213  3351        May
## 122  0.03319388    847      3554  4401        May
## 123  1.83914264    603      3848  4451        May
## 124  1.65854777    255      2378  2633        May
## 125  0.75557339    614      3819  4433        May
## 126 -0.32799587    894      3714  4608        May
## 127 -0.32799587   1612      3102  4714        May
## 128 -1.23097025   1401      2932  4333        May
## 129  0.03319388    664      3698  4362        May
## 130 -0.86978050    694      4109  4803        May
## 131 -0.68918562    550      3632  4182        May
## 132  0.03319388    695      4169  4864        May
## 133 -0.32799587    692      3413  4105        May
## 134 -0.68918562    902      2507  3409        May
## 135 -0.68918562   1582      2971  4553        May
## 136 -0.68918562    773      3185  3958        May
## 137  1.29735801    678      3445  4123        May
## 138  0.39438363    536      3319  3855        May
## 139 -1.14067281    735      3840  4575        May
## 140 -1.05037537    909      4008  4917        May
## 141 -0.86978050   2258      3547  5805        May
## 142 -0.68918562   1576      3084  4660        May
## 143  0.39438363    836      3438  4274        May
## 144  0.03319388    659      3833  4492        May
## 145 -0.68918562    740      4238  4978        May
## 146 -0.14740099    758      3919  4677        May
## 147  0.75557339    871      3808  4679        May
## 148  0.39438363   2001      2757  4758        May
## 149  0.39438363   2355      2433  4788        May
## 150 -1.05037537   1549      2549  4098        May
## 151 -0.86978050    673      3309  3982        May
## 152  0.03319388    513      3461  3974       June
## 153  1.29735801    736      4232  4968       June
## 154  1.11676314    898      4414  5312       June
## 155 -1.05037537   1869      3473  5342       June
## 156 -0.32799587   1685      3221  4906       June
## 157 -0.68918562    673      3875  4548       June
## 158 -0.14740099    763      4070  4833       June
## 159 -0.68918562    676      3725  4401       June
## 160 -0.50859075    563      3352  3915       June
## 161 -0.68918562    815      3771  4586       June
## 162 -0.50859075   1729      3237  4966       June
## 163 -0.32799587   1467      2993  4460       June
## 164  1.29735801    863      4157  5020       June
## 165  0.93616826    727      4164  4891       June
```

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## 166 -0.32799587    769      4411  5180      June
## 167  0.03319388    545      3222  3767      June
## 168 -0.68918562    863      3981  4844      June
## 169 -0.86978050   1807      3312  5119      June
## 170 -1.05037537   1639      3105  4744      June
## 171 -0.32799587    699      3311  4010      June
## 172 -0.32799587    774      4061  4835      June
## 173 -0.14740099    661      3846  4507      June
## 174  0.39438363    746      4044  4790      June
## 175  0.39438363    969      4022  4991      June
## 176  0.03319388   1782      3420  5202      June
## 177 -1.05037537   1920      3385  5305      June
## 178 -0.68918562    854      3854  4708      June
## 179 -0.32799587    732      3916  4648      June
## 180  0.93616826    848      4377  5225      June
## 181  0.03319388   1027      4488  5515      June
## 182 -0.68918562   1246      4116  5362      July
## 183 -1.05037537   2204      2915  5119      July
## 184 -0.14740099   2282      2367  4649      July
## 185 -1.23097025   3065      2978  6043      July
## 186 -1.05037537   1031      3634  4665      July
## 187 -0.32799587    784      3845  4629      July
## 188 -0.32799587    754      3838  4592      July
## 189  0.39438363    692      3348  4040      July
## 190 -0.32799587   1988      3348  5336      July
## 191  0.03319388   1743      3138  4881      July
## 192  1.11676314    723      3363  4086      July
## 193  0.03319388    662      3596  4258      July
## 194 -0.32799587    748      3594  4342      July
## 195  0.75557339    888      4196  5084      July
## 196  0.03319388   1318      4220  5538      July
## 197  0.39438363   2418      3505  5923      July
## 198  0.39438363   2006      3296  5302      July
## 199  0.39438363    841      3617  4458      July
## 200 -0.68918562    752      3789  4541      July
## 201 -1.05037537    644      3688  4332      July
## 202  0.39438363    632      3152  3784      July
## 203 -1.05037537    562      2825  3387      July
## 204 -0.68918562    987      2298  3285      July
## 205 -0.50859075   1050      2556  3606      July
## 206 -1.23097025    568      3272  3840      July
## 207  0.39438363    750      3840  4590      July
## 208  0.21378876    755      3901  4656      July
## 209  0.03319388    606      3784  4390      July
## 210  0.03319388    670      3176  3846      July
## 211 -0.32799587   1559      2916  4475      July
## 212 -0.32799587   1524      2778  4302      July
## 213 -0.14740099    729      3537  4266    August
## 214  0.39438363    801      4044  4845    August
## 215 -0.68918562    467      3107  3574    August
```

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## 216  0.21378876   799     3777  4576    August
## 217  0.39438363  1023     3843  4866    August
## 218  0.39438363  1521     2773  4294    August
## 219  0.03319388  1298     2487  3785    August
## 220 -0.50859075   846     3480  4326    August
## 221 -0.32799587   907     3695  4602    August
## 222  0.21378876   884     3896  4780    August
## 223 -0.32799587   812     3980  4792    August
## 224 -0.68918562  1051     3854  4905    August
## 225  0.03319388  1504     2646  4150    August
## 226  0.21378876  1338     2482  3820    August
## 227  0.39438363   775     3563  4338    August
## 228  0.57497851   721     4004  4725    August
## 229 -0.32799587   668     4026  4694    August
## 230  0.75557339   639     3166  3805    August
## 231 -1.23097025   797     3356  4153    August
## 232 -0.68918562  1914     3277  5191    August
## 233  0.75557339  1249     2624  3873    August
## 234  1.29735801   833     3925  4758    August
## 235 -0.14740099  1281     4614  5895    August
## 236  1.29735801   949     4181  5130    August
## 237  1.29735801   435     3107  3542    August
## 238 -1.05037537   768     3893  4661    August
## 239  3.01300933   226      889  1115    August
## 240  2.38092727  1415     2919  4334    August
## 241 -0.32799587   729     3905  4634    August
## 242 -0.68918562   775     4429  5204    August
## 243 -1.23097025   688     4370  5058    August
## 244 -0.68918562   783     4332  5115 September
## 245 -0.68918562   875     3852  4727 September
## 246 -0.32799587  1935     2549  4484 September
## 247  0.03319388  2521     2419  4940 September
## 248 -0.32799587  1236     2115  3351 September
## 249  2.01973752   204     2506  2710 September
## 250 -1.05037537   118     1878  1996 September
## 251 -0.32799587   153     1689  1842 September
## 252 -0.68918562   417     3127  3544 September
## 253 -0.68918562  1750     3595  5345 September
## 254 -1.05037537  1633     3413  5046 September
## 255 -1.23097025   690     4023  4713 September
## 256 -0.68918562   701     4062  4763 September
## 257 -0.50859075   647     4138  4785 September
## 258  0.93616826   428     3231  3659 September
## 259 -0.14740099   742     4018  4760 September
## 260  0.03319388  1434     3077  4511 September
## 261  0.03319388  1353     2921  4274 September
## 262 -0.32799587   691     3848  4539 September
## 263 -0.32799587   438     3203  3641 September
## 264 -1.14067281   539     3813  4352 September
## 265 -1.05037537   555     4240  4795 September
```

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## 266 -1.23097025    258      2137   2395 September
## 267 -1.23097025   1776      3647   5423 September
## 268 -1.77275488   1544      3466   5010 September
## 269 -0.68918562    684      3946   4630 September
## 270 -1.05037537    477      3643   4120 September
## 271 -0.86978050    480      3427   3907 September
## 272  0.03319388    653      4186   4839 September
## 273  0.03319388    830      4372   5202 September
## 274  1.65854777    480      1949   2429   October
## 275  0.39438363    616      2302   2918   October
## 276 -1.05037537    330      3240   3570   October
## 277  0.39438363    486      3970   4456   October
## 278 -0.32799587    559      4267   4826   October
## 279 -0.68918562    639      4126   4765   October
## 280 -2.31453951    949      4036   4985   October
## 281 -2.31453951   2235      3174   5409   October
## 282 -1.23097025   2397      3114   5511   October
## 283 -2.31453951   1514      3603   5117   October
## 284 -0.50859075    667      3896   4563   October
## 285  0.75557339    217      2199   2416   October
## 286 -0.68918562    290      2623   2913   October
## 287  0.03319388    529      3115   3644   October
## 288  0.21378876   1899      3318   5217   October
## 289  0.93616826   1748      3293   5041   October
## 290 -0.32799587    713      3857   4570   October
## 291 -1.05037537    637      4111   4748   October
## 292  0.03319388    254      2170   2424   October
## 293  2.74211702    471      3724   4195   October
## 294  0.39438363    676      3628   4304   October
## 295 -1.23097025   1499      2809   4308   October
## 296 -1.05037537   1619      2762   4381   October
## 297 -1.05037537    699      3488   4187   October
## 298 -0.68918562    695      3992   4687   October
## 299 -0.32799587    404      3490   3894   October
## 300 -0.50859075    240      2419   2659   October
## 301  0.57497851    456      3291   3747   October
## 302  2.01973752     57       570    627   October
## 303  0.21378876    885      2446   3331   October
## 304 -0.86978050    362      3307   3669   October
## 305 -0.50859075    410      3658   4068  November
## 306 -1.14067281    370      3816   4186  November
## 307 -0.68918562    318      3656   3974  November
## 308  1.65854777    470      3576   4046  November
## 309  0.39438363   1156      2770   3926  November
## 310 -1.23097025    952      2697   3649  November
## 311 -1.23097025    373      3662   4035  November
## 312 -1.23097025    376      3829   4205  November
## 313 -2.31453951    305      3804   4109  November
## 314  0.39438363    190      2743   2933  November
## 315  1.38765545    440      2928   3368  November
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## 316   0.39438363   1275      2792   4067   November
## 317   1.29735801   1004      2713   3717   November
## 318   1.29735801    595      3891   4486   November
## 319  -0.14740099    449      3746   4195   November
## 320  -0.68918562    145      1672   1817   November
## 321   1.29735801    139      2914   3053   November
## 322  -0.32799587    245      3147   3392   November
## 323   0.75557339    943      2720   3663   November
## 324   0.03319388    787      2733   3520   November
## 325  -0.50859075    220      2545   2765   November
## 326  -1.05037537     69      1538   1607   November
## 327   2.38092727    112      2454   2566   November
## 328  -0.50859075    560       935   1495   November
## 329  -1.05037537   1095      1697   2792   November
## 330  -1.23097025   1249      1819   3068   November
## 331   0.75557339    810      2261   3071   November
## 332  -0.68918562    253      3614   3867   November
## 333   1.29735801     96      2818   2914   November
## 334   1.11676314    188      3425   3613   November
## 335   0.39438363    182      3545   3727   December
## 336  -1.23097025    268      3672   3940   December
## 337  -1.23097025    706      2908   3614   December
## 338  -1.05037537    634      2851   3485   December
## 339  -1.23097025    233      3578   3811   December
## 340   0.39438363    126      2468   2594   December
## 341   0.57497851     50       655    705   December
## 342   0.39438363    150      3172   3322   December
## 343  -1.23097025    261      3359   3620   December
## 344   0.39438363    502      2688   3190   December
## 345  -2.31453951    377      2366   2743   December
## 346  -1.23097025    143      3167   3310   December
## 347  -0.32799587    155      3368   3523   December
## 348  -1.23097025    178      3562   3740   December
## 349   1.11676314    181      3528   3709   December
## 350   0.93616826    178      3399   3577   December
## 351   0.57497851    275      2464   2739   December
## 352  -0.32799587    220      2211   2431   December
## 353  -0.32799587    260      3143   3403   December
## 354  -2.31453951    216      3534   3750   December
## 355   0.75557339    107      2553   2660   December
## 356  -2.31453951    227      2841   3068   December
## 357   0.75557339    163      2046   2209   December
## 358  -0.32799587    155       856   1011   December
## 359  -0.50859075    303       451    754   December
## 360   0.57497851    430       887   1317   December
## 361  -0.68918562    103      1059   1162   December
## 362   0.75557339    255      2047   2302   December
## 363  -0.86978050    254      2169   2423   December
## 364  -1.05037537    491      2508   2999   December
## 365   0.03319388    665      1820   2485   December
```

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## 366  0.75557339   686      1608  2294    January
## 367  1.47795289   244      1707  1951    January
## 368  2.01973752    89      2147  2236    January
## 369  0.03319388    95      2273  2368    January
## 370 -1.23097025   140      3132  3272    January
## 371 -0.14740099   307      3791  4098    January
## 372  0.03319388  1070      3451  4521    January
## 373  0.21378876   599      2826  3425    January
## 374 -1.05037537   106      2270  2376    January
## 375 -0.32799587   173      3425  3598    January
## 376 -0.68918562    92      2085  2177    January
## 377  0.03319388   269      3828  4097    January
## 378  2.01973752   174      3040  3214    January
## 379  0.39438363   333      2160  2493    January
## 380  0.57497851   284      2027  2311    January
## 381  1.20706058   217      2081  2298    January
## 382  1.65854777   127      2808  2935    January
## 383  2.56152214   109      3267  3376    January
## 384  0.75557339   130      3162  3292    January
## 385  0.21378876   115      3048  3163    January
## 386  0.75557339    67      1234  1301    January
## 387  0.03319388   196      1781  1977    January
## 388 -0.68918562   145      2287  2432    January
## 389 -0.86978050   439      3900  4339    January
## 390 -0.32799587   467      3803  4270    January
## 391 -1.05037537   244      3831  4075    January
## 392  1.65854777   269      3187  3456    January
## 393  0.21378876   775      3248  4023    January
## 394  0.57497851   558      2685  3243    January
## 395  0.03319388   126      3498  3624    January
## 396  0.93616826   324      4185  4509    January
## 397 -0.32799587   304      4275  4579    February
## 398 -0.50859075   190      3571  3761    February
## 399 -0.14740099   310      3841  4151    February
## 400 -0.68918562   384      2448  2832    February
## 401 -0.32799587   318      2629  2947    February
## 402 -0.68918562   206      3578  3784    February
## 403 -0.14740099   199      4176  4375    February
## 404 -0.68918562   109      2693  2802    February
## 405  0.39438363   163      3667  3830    February
## 406 -0.68918562   227      3604  3831    February
## 407  0.75557339   192      1977  2169    February
## 408  2.38092727    73      1456  1529    February
## 409 -0.68918562    94      3328  3422    February
## 410 -1.05037537   135      3787  3922    February
## 411 -0.32799587   141      4028  4169    February
## 412 -1.23097025    74      2931  3005    February
## 413  0.03319388   349      3805  4154    February
## 414  0.39438363  1435      2883  4318    February
## 415  0.75557339   618      2071  2689    February
```

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## 416   0.39438363    502      2627  3129  February
## 417   0.21378876    163      3614  3777  February
## 418   0.93616826    394      4379  4773  February
## 419   0.03319388    516      4546  5062  February
## 420  -0.14740099    246      3241  3487  February
## 421   2.74211702    317      2415  2732  February
## 422   0.39438363    515      2874  3389  February
## 423   0.75557339    253      4069  4322  February
## 424  -0.68918562    229      4134  4363  February
## 425  -0.68918562     65      1769  1834  February
## 426   0.39438363    325      4665  4990     March
## 427  -0.32799587    246      2948  3194     March
## 428  -0.32799587    956      3110  4066     March
## 429   1.47795289    710      2713  3423     March
## 430   0.21378876    203      3130  3333     March
## 431   0.39438363    221      3735  3956     March
## 432   1.65854777    432      4484  4916     March
## 433   3.10330677    486      4896  5382     March
## 434   2.38092727    447      4122  4569     March
## 435   0.75557339    968      3150  4118     March
## 436   0.39438363   1658      3253  4911     March
## 437   0.21378876    838      4460  5298     March
## 438   0.39438363    762      5085  5847     March
## 439  -1.05037537    997      5315  6312     March
## 440  -0.86978050   1005      5187  6192     March
## 441  -1.23097025    548      3830  4378     March
## 442  -1.05037537   3155      4681  7836     March
## 443  -0.68918562   2207      3685  5892     March
## 444  -0.32799587    982      5171  6153     March
## 445  -0.68918562   1051      5042  6093     March
## 446  -1.23097025   1122      5108  6230     March
## 447  -1.14067281   1334      5537  6871     March
## 448  -1.05037537   2469      5893  8362     March
## 449   0.03319388   1033      2339  3372     March
## 450   0.57497851   1532      3464  4996     March
## 451   3.10330677    795      4763  5558     March
## 452   0.03319388    531      4571  5102     March
## 453   1.29735801    674      5024  5698     March
## 454   1.29735801    834      5299  6133     March
## 455  -0.50859075    796      4663  5459     March
## 456   0.75557339   2301      3934  6235     March
## 457  -0.32799587   2347      3694  6041     April
## 458   1.29735801   1208      4728  5936     April
## 459  -1.23097025   1348      5424  6772     April
## 460   0.03319388   1058      5378  6436     April
## 461   0.03319388   1192      5265  6457     April
## 462   1.47795289   1807      4653  6460     April
## 463   0.75557339   3252      3605  6857     April
## 464   0.39438363   2230      2939  5169     April
## 465   2.01973752    905      4680  5585     April
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## 466   0.21378876    819    5099   5918    April
## 467   1.29735801    482    4380   4862    April
## 468   1.11676314    663    4746   5409    April
## 469  -0.32799587   1252    5146   6398    April
## 470  -0.32799587   2795    4665   7460    April
## 471   0.75557339   2846    4286   7132    April
## 472   0.75557339   1198    5172   6370    April
## 473   0.75557339    989    5702   6691    April
## 474   0.03319388    347    4020   4367    April
## 475  -1.23097025    846    5719   6565    April
## 476   0.03319388   1340    5950   7290    April
## 477   0.93616826   2541    4083   6624    April
## 478   1.83914264    120     907   1027    April
## 479   1.65854777    195    3019   3214    April
## 480   0.57497851    518    5115   5633    April
## 481  -1.23097025    655    5541   6196    April
## 482  -0.14740099    475    4551   5026    April
## 483   1.83914264   1014    5219   6233    April
## 484  -0.68918562   1120    3100   4220    April
## 485  -0.68918562   2229    4075   6304    April
## 486  -0.32799587    665    4907   5572    April
## 487  -0.68918562    653    5087   5740      May
## 488  -0.14740099    667    5502   6169      May
## 489  -0.68918562    764    5657   6421      May
## 490  -0.86978050   1069    5227   6296      May
## 491  -0.68918562   2496    4387   6883      May
## 492  -0.32799587   2135    4224   6359      May
## 493   0.39438363   1008    5265   6273      May
## 494   1.11676314    738    4990   5728      May
## 495   0.03319388    620    4097   4717      May
## 496   1.83914264   1026    5546   6572      May
## 497   0.75557339   1319    5711   7030      May
## 498  -0.68918562   2622    4807   7429      May
## 499   0.21378876   2172    3946   6118      May
## 500   0.39438363    342    2501   2843      May
## 501  -0.68918562    625    4490   5115      May
## 502  -0.68918562    991    6433   7424      May
## 503   0.03319388   1242    6142   7384      May
## 504  -0.68918562   1521    6118   7639      May
## 505  -1.23097025   3410    4884   8294      May
## 506   1.65854777   2704    4425   7129      May
## 507   0.75557339    630    3729   4359      May
## 508  -1.05037537    819    5254   6073      May
## 509  -1.05037537    766    4494   5260      May
## 510  -0.32799587   1059    5711   6770      May
## 511  -0.68918562   1417    5317   6734      May
## 512   0.03319388   2855    3681   6536      May
## 513   0.39438363   3283    3308   6591      May
## 514  -0.32799587   2557    3486   6043      May
## 515   1.29735801    880    4863   5743      May
```

```
## 516 -0.68918562    745    6110  6855    May
## 517  0.03319388   1100    6238  7338    May
## 518  0.39438363    533    3594  4127   June
## 519  0.03319388   2795    5325  8120   June
## 520 -0.14740099   2494    5147  7641   June
## 521  1.29735801   1071    5927  6998   June
## 522  0.03319388    968    6033  7001   June
## 523 -1.23097025   1027    6028  7055   June
## 524 -0.32799587   1038    6456  7494   June
## 525 -0.32799587   1488    6248  7736   June
## 526 -0.32799587   2708    4790  7498   June
## 527 -0.86978050   2224    4374  6598   June
## 528  0.03319388   1017    5647  6664   June
## 529  0.03319388    477    4495  4972   June
## 530  2.38092727   1173    6248  7421   June
## 531  0.75557339   1180    6183  7363   June
## 532 -0.32799587   1563    6102  7665   June
## 533 -0.14740099   2963    4739  7702   June
## 534 -0.32799587   2634    4344  6978   June
## 535 -0.14740099    653    4446  5099   June
## 536 -0.68918562    968    5857  6825   June
## 537 -1.05037537    872    5339  6211   June
## 538 -0.86978050    778    5127  5905   June
## 539 -0.32799587    964    4859  5823   June
## 540  0.03319388   2657    4801  7458   June
## 541 -0.68918562   2551    4340  6891   June
## 542  1.29735801   1139    5640  6779   June
## 543  2.01973752   1077    6365  7442   June
## 544  1.20706058   1077    6258  7335   June
## 545 -0.32799587    921    5958  6879   June
## 546  0.03319388    829    4634  5463   June
## 547 -0.50859075   1455    4232  5687   June
## 548 -0.68918562   1421    4110  5531   July
## 549  0.03319388    904    5323  6227   July
## 550 -0.68918562   1052    5608  6660   July
## 551 -0.68918562   2562    4841  7403   July
## 552  0.21378876   1405    4836  6241   July
## 553 -0.68918562   1366    4841  6207   July
## 554 -0.32799587   1448    3392  4840   July
## 555 -1.05037537   1203    3469  4672   July
## 556 -0.32799587    998    5571  6569   July
## 557 -0.68918562    954    5336  6290   July
## 558 -0.50859075    975    6289  7264   July
## 559 -0.68918562   1032    6414  7446   July
## 560 -1.05037537   1511    5988  7499   July
## 561 -1.05037537   2355    4614  6969   July
## 562 -0.68918562   1920    4111  6031   July
## 563 -0.86978050   1088    5742  6830   July
## 564 -0.86978050    921    5865  6786   July
## 565 -0.68918562    799    4914  5713   July
```

```
## 566 -0.68918562    888     5703  6591     July
## 567 -0.32799587    747     5123  5870     July
## 568  0.75557339   1264     3195  4459     July
## 569 -1.05037537   2544     4866  7410     July
## 570 -0.68918562   1135     5831  6966     July
## 571  0.21378876   1140     6452  7592     July
## 572 -0.32799587   1383     6790  8173     July
## 573  0.75557339   1036     5825  6861     July
## 574 -0.50859075   1259     5645  6904     July
## 575 -0.32799587   2234     4451  6685     July
## 576 -0.32799587   2153     4444  6597     July
## 577 -0.32799587   1040     6065  7105     July
## 578 -0.32799587    968     6248  7216     July
## 579 -0.68918562   1074     6506  7580   August
## 580 -0.86978050    983     6278  7261   August
## 581  0.39438363   1328     5847  7175   August
## 582  0.75557339   2345     4479  6824   August
## 583  0.75557339   1707     3757  5464   August
## 584 -0.68918562   1233     5780  7013   August
## 585 -0.68918562   1278     5995  7273   August
## 586 -0.86978050   1263     6271  7534   August
## 587 -0.32799587   1196     6090  7286   August
## 588  1.11676314   1065     4721  5786   August
## 589  0.03319388   2247     4052  6299   August
## 590 -0.68918562   2182     4362  6544   August
## 591 -1.05037537   1207     5676  6883   August
## 592  0.03319388   1128     5656  6784   August
## 593  0.03319388   1198     6149  7347   August
## 594 -0.32799587   1338     6267  7605   August
## 595  0.21378876   1483     5665  7148   August
## 596  0.03319388   2827     5038  7865   August
## 597 -1.05037537   1208     3341  4549   August
## 598 -0.86978050   1026     5504  6530   August
## 599 -1.77275488   1081     5925  7006   August
## 600 -2.31453951   1094     6281  7375   August
## 601 -1.23097025   1363     6402  7765   August
## 602 -1.77275488   1325     6257  7582   August
## 603  0.93616826   1829     4224  6053   August
## 604  0.39438363   1483     3772  5255   August
## 605 -0.68918562    989     5928  6917   August
## 606 -0.14740099    935     6105  7040   August
## 607 -0.68918562   1177     6520  7697   August
## 608 -1.14067281   1172     6541  7713   August
## 609 -0.32799587   1433     5917  7350   August
## 610 -0.86978050   2352     3788  6140 September
## 611 -1.23097025   2613     3197  5810 September
## 612 -0.68918562   1965     4069  6034 September
## 613  0.75557339    867     5997  6864 September
## 614  0.03319388    832     6280  7112 September
## 615 -0.50859075    611     5592  6203 September
```

```
## 616 -0.68918562   1045      6459   7504 September
## 617  0.75557339   1557      4419   5976 September
## 618  0.75557339   2570      5657   8227 September
## 619  1.11676314   1118      6407   7525 September
## 620 -1.05037537   1070      6697   7767 September
## 621 -0.68918562   1050      6820   7870 September
## 622 -1.23097025   1054      6750   7804 September
## 623 -1.05037537   1379      6630   8009 September
## 624  0.93616826   3160      5554   8714 September
## 625 -1.05037537   2166      5167   7333 September
## 626 -0.32799587   1022      5847   6869 September
## 627  1.47795289    371      3702   4073 September
## 628  0.75557339    788      6803   7591 September
## 629 -1.05037537    939      6781   7720 September
## 630 -0.14740099   1250      6917   8167 September
## 631  1.11676314   2512      5883   8395 September
## 632  0.57497851   2454      5453   7907 September
## 633 -0.68918562   1001      6435   7436 September
## 634  0.75557339    845      6693   7538 September
## 635  0.75557339    787      6946   7733 September
## 636 -1.23097025    751      6642   7393 September
## 637 -0.37856244   1045      6370   7415 September
## 638  0.31492189   2589      5966   8555 September
## 639 -0.43635280   2015      4874   6889 September
## 640 -1.18762748    763      6015   6778    October
## 641 -0.95646604    315      4324   4639    October
## 642 -1.47657928    728      6844   7572    October
## 643 -0.86978050    891      6437   7328    October
## 644 -0.98536122   1516      6640   8156    October
## 645  0.89282549   3031      4934   7965    October
## 646 -0.49414316    781      2729   3510    October
## 647 -0.03182027    874      4604   5478    October
## 648  0.02597009    601      5791   6392    October
## 649 -0.43635280    780      6911   7691    October
## 650  0.02597009    834      6736   7570    October
## 651  0.51718815   1060      6222   7282    October
## 652 -0.34966726   2252      4857   7109    October
## 653  1.00840621   2080      4559   6639    October
## 654  1.06619657    760      5115   5875    October
## 655 -0.14740099    922      6612   7534    October
## 656 -1.10094194    979      6482   7461    October
## 657  0.51718815   1008      6501   7509    October
## 658 -0.63861906    753      4671   5424    October
## 659 -0.72530460   2806      5284   8090    October
## 660 -0.32077208   2132      4692   6824    October
## 661 -1.24541784    830      6228   7058    October
## 662 -1.21652266    841      6625   7466    October
## 663 -1.44768410    795      6898   7693    October
## 664 -0.63861906    875      6484   7359    October
## 665 -0.63861906   1182      6262   7444    October
```

```
## 666  0.54608333   2643      5209   7852    October
## 667  2.53985076    998      3461   4459    October
## 668  4.93815071      2        20     22    October
## 669  1.49962427     87      1009   1096    October
## 670 -0.34966726    419      5147   5566    October
## 671 -0.46524798    466      5520   5986    November
## 672  1.00840621    618      5229   5847    November
## 673  0.97951103   1029      4109   5138    November
## 674 -0.08961063   1201      3906   5107    November
## 675  0.48829297    378      4881   5259    November
## 676 -0.14740099    466      5220   5686    November
## 677  1.35514837    326      4709   5035    November
## 678  1.99084234    340      4975   5315    November
## 679  0.17044599    709      5283   5992    November
## 680 -1.62105518   2090      4446   6536    November
## 681 -0.75419978   2290      4562   6852    November
## 682 -0.08961063   1097      5172   6269    November
## 683  1.81747126    327      3767   4094    November
## 684  0.02597009    373      5122   5495    November
## 685 -0.46524798    320      5125   5445    November
## 686 -0.23408653    484      5214   5698    November
## 687 -0.14740099   1313      4316   5629    November
## 688  0.45939779    922      3747   4669    November
## 689  0.40160743    449      5050   5499    November
## 690 -1.33210338    534      5100   5634    November
## 691 -1.01425640    615      4531   5146    November
## 692 -1.67884554    955      1470   2425    November
## 693 -0.37856244   1603      2307   3910    November
## 694  2.13531824    532      1745   2277    November
## 695 -0.55193352    309      2115   2424    November
## 696 -1.70774072    337      4750   5087    November
## 697  0.66166405    123      3836   3959    November
## 698  0.14155081    198      5062   5260    November
## 699 -0.50859075    243      5080   5323    November
## 700 -2.31453951    362      5306   5668    November
## 701 -1.44768410    951      4240   5191    December
## 702 -0.68918562    892      3757   4649    December
## 703 -1.05037537    555      5679   6234    December
## 704  0.03319388    551      6055   6606    December
## 705  1.11676314    331      5398   5729    December
## 706 -0.14740099    340      5035   5375    December
## 707 -0.68918562    349      4659   5008    December
## 708 -1.05037537   1153      4429   5582    December
## 709 -0.68918562    441      2787   3228    December
## 710  0.39438363    329      4841   5170    December
## 711  1.47795289    282      5219   5501    December
## 712  0.21378876    310      5009   5319    December
## 713  0.03319388    425      5107   5532    December
## 714 -1.05037537    429      5182   5611    December
## 715 -1.05037537    767      4280   5047    December
```

```
## 716 -1.05037537    538      3248  3786  December
## 717 -1.05037537    212      4373  4585  December
## 718  0.21378876    433      5124  5557  December
## 719 -0.68918562    333      4934  5267  December
## 720 -0.32799587    314      3814  4128  December
## 721  2.38092727    221      3402  3623  December
## 722  2.74211702    205      1544  1749  December
## 723 -0.68918562    408      1379  1787  December
## 724 -1.23097025    174       746   920  December
## 725 -0.32799587    440       573  1013  December
## 726  1.65854777      9       432   441  December
## 727  1.47795289    247      1867  2114  December
## 728 -0.68918562    644      2451  3095  December
## 729 -1.23097025    159      1182  1341  December
## 730  2.01973752    364      1432  1796  December
## 731 -0.32799587    439      2290  2729  December
```

```r
#2.Basic Regression
fitAll <- lm(formula = COUNT ~ ., data = dfbStd )

summary(fitAll)
```

```
## Warning in summary.lm(fitAll): essentially perfect fit: summary may be
## unreliable

##
## Call:
## lm(formula = COUNT ~ ., data = dfbStd)
##
## Residuals:
##        Min          1Q      Median          3Q         Max
## -2.130e-11  -1.608e-13   1.820e-14   1.972e-13   2.883e-11
##
## Coefficients:
##                  Estimate Std. Error    t value Pr(>|t|)
## (Intercept)   -4.289e-11  7.537e-12  -5.691e+00 1.85e-08 ***
## DATE           2.909e-15  5.104e-16   5.698e+00 1.77e-08 ***
## HOLIDAYYES    -4.205e-14  3.764e-13  -1.120e-01   0.9111
## WEEKDAYYES    -8.479e-13  2.125e-13  -3.990e+00 7.29e-05 ***
## WEATHERSIT     3.566e-13  1.447e-13   2.465e+00   0.0140 *
## TEMP           3.776e-13  4.324e-13   8.730e-01   0.3828
## ATEMP          4.367e-13  4.049e-13   1.079e+00   0.2812
## HUMIDITY       1.400e-13  8.356e-14   1.676e+00   0.0942 .
## WINDSPEED      7.337e-14  6.537e-14   1.122e+00   0.2621
## CASUAL         1.000e+00  1.612e-16   6.204e+15  < 2e-16 ***
## REGISTERED     1.000e+00  8.696e-17   1.150e+16  < 2e-16 ***
## MONTHAugust   -1.965e-13  3.362e-13  -5.840e-01   0.5591
## MONTHDecember  1.561e-13  3.439e-13   4.540e-01   0.6501
## MONTHFebruary  2.302e-13  3.202e-13   7.190e-01   0.4724
## MONTHJanuary  -7.314e-14  3.410e-13  -2.150e-01   0.8302
## MONTHJuly     -2.267e-13  3.643e-13  -6.220e-01   0.5339
```

```
## MONTHJune       -2.030e-13  3.283e-13 -6.180e-01   0.5366
## MONTHMarch       1.247e-13  2.839e-13  4.390e-01   0.6607
## MONTHMay        -6.726e-14  2.953e-13 -2.280e-01   0.8199
## MONTHNovember    1.349e-13  3.157e-13  4.270e-01   0.6694
## MONTHOctober    -2.730e-15  2.900e-13 -9.000e-03   0.9925
## MONTHSeptember -1.123e-13  3.088e-13 -3.640e-01   0.7162
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.52e-12 on 709 degrees of freedom
## Multiple R-squared:      1,  Adjusted R-squared:      1
## F-statistic: 5.648e+31 on 21 and 709 DF,  p-value: < 2.2e-16
```
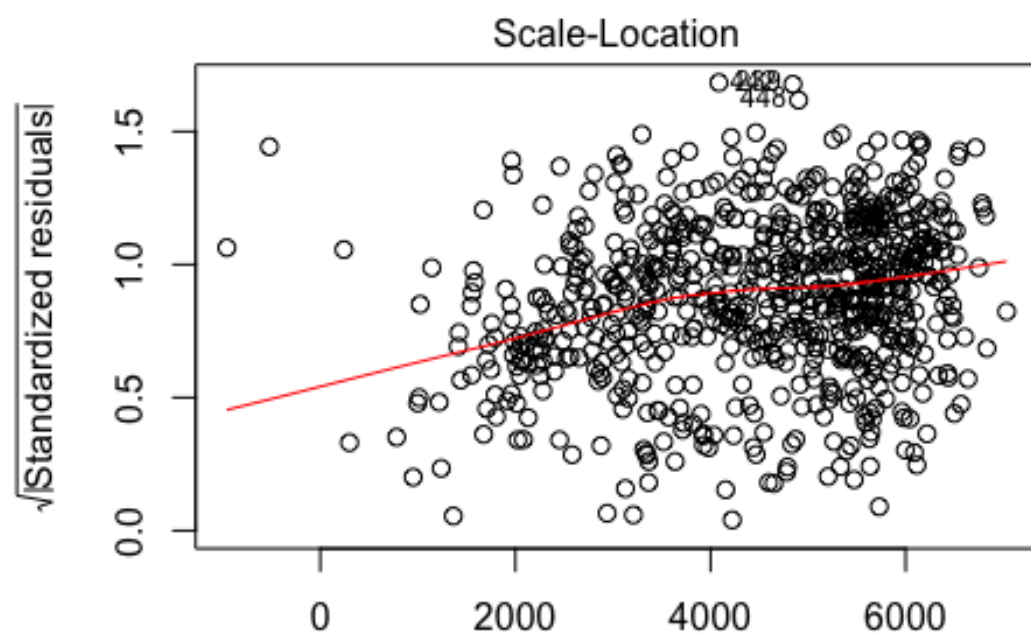
#3.a
```
dfbOrg <-
  dfbOrg %>%
  mutate(BADWEATHER = ifelse(WEATHERSIT == 3|WEATHERSIT == 4, 'YES', 'NO'))
dfbOrg
```

```
## # A tibble: 731 x 13
##    DATE       HOLIDAY WEEKDAY WEATHERSIT  TEMP ATEMP HUMIDITY WINDSPEED
CASUAL
##    <date>     <chr>   <chr>        <dbl> <dbl> <dbl>    <dbl>     <dbl>
<dbl>
##  1 2011-01-01 NO      NO               2    11    11       81        17
331
##  2 2011-01-02 NO      NO               2     9   6.5     71.5        17
131
##  3 2011-01-03 NO      YES              1     1     4       44        18
120
##  4 2011-01-04 NO      YES              1     2   2.5       64         9
108
##  5 2011-01-05 NO      YES              1   2.5     1     42.5        13
82
##  6 2011-01-06 NO      YES              1     2     2       52         6
88
##  7 2011-01-07 NO      YES              2     1     3     47.5        11
148
##  8 2011-01-08 NO      NO               2     1     5       51        17
68
##  9 2011-01-09 NO      NO               1     2   8.5       46        25
54
## 10 2011-01-10 NO      YES              1     2     6       50        15
41
## # … with 721 more rows, and 4 more variables: REGISTERED <dbl>, COUNT
<dbl>,
## #   MONTH <chr>, BADWEATHER <chr>
```

#3.b
```
scat1 <- dfbOrg %>%
```

```
  ggplot(aes(x = ATEMP, y = COUNT)) + geom_point(aes(color = BADWEATHER))
scat1
```
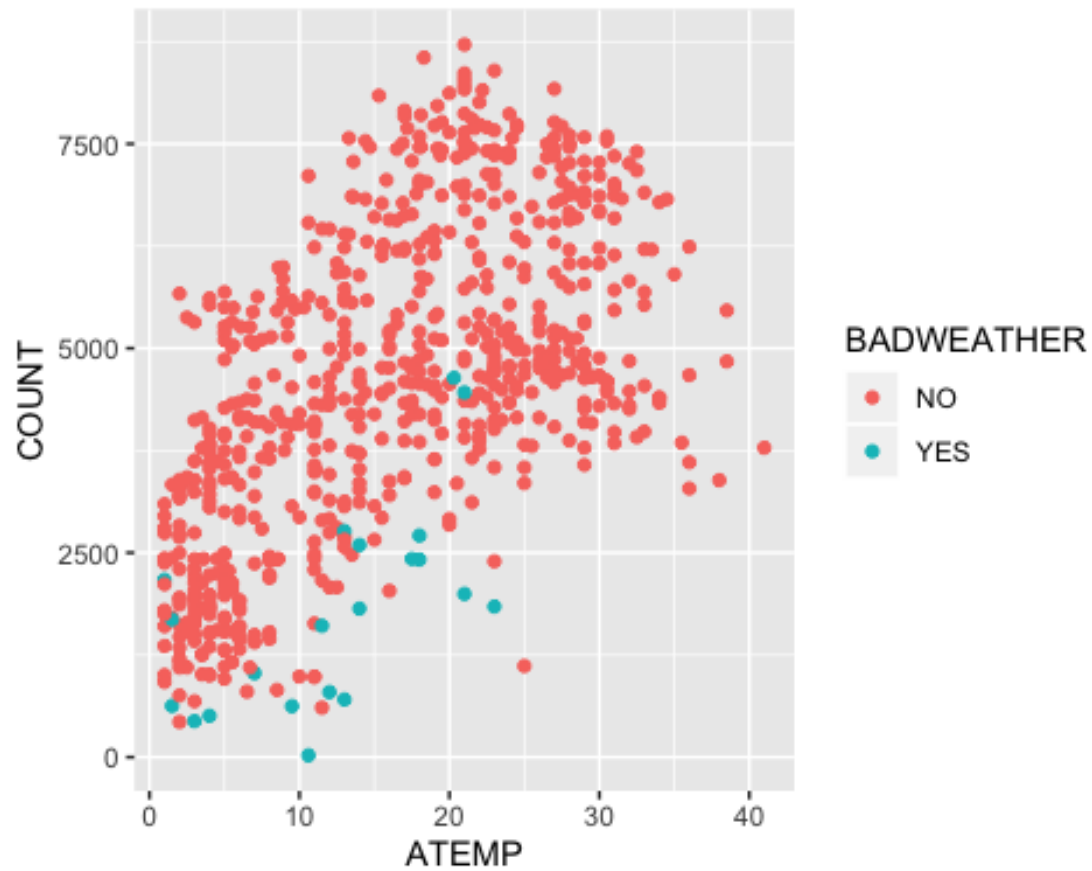
```
scat2 <- dfbOrg %>%
  ggplot(aes(x = ATEMP, y = CASUAL)) + geom_point(aes(color = BADWEATHER))
scat2
```
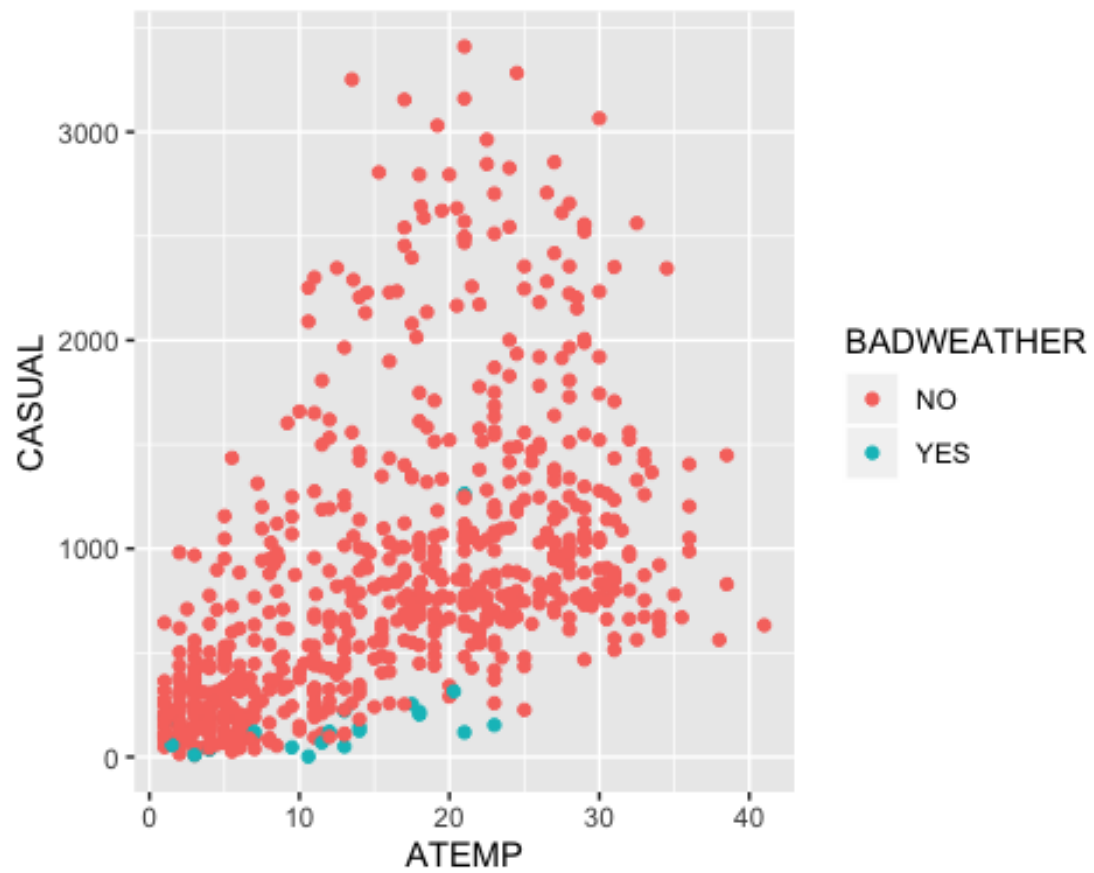
```
scat3 <- dfbOrg %>%
  ggplot(aes(x = ATEMP, y = REGISTERED)) + geom_point(aes(color =
BADWEATHER))
scat3
```
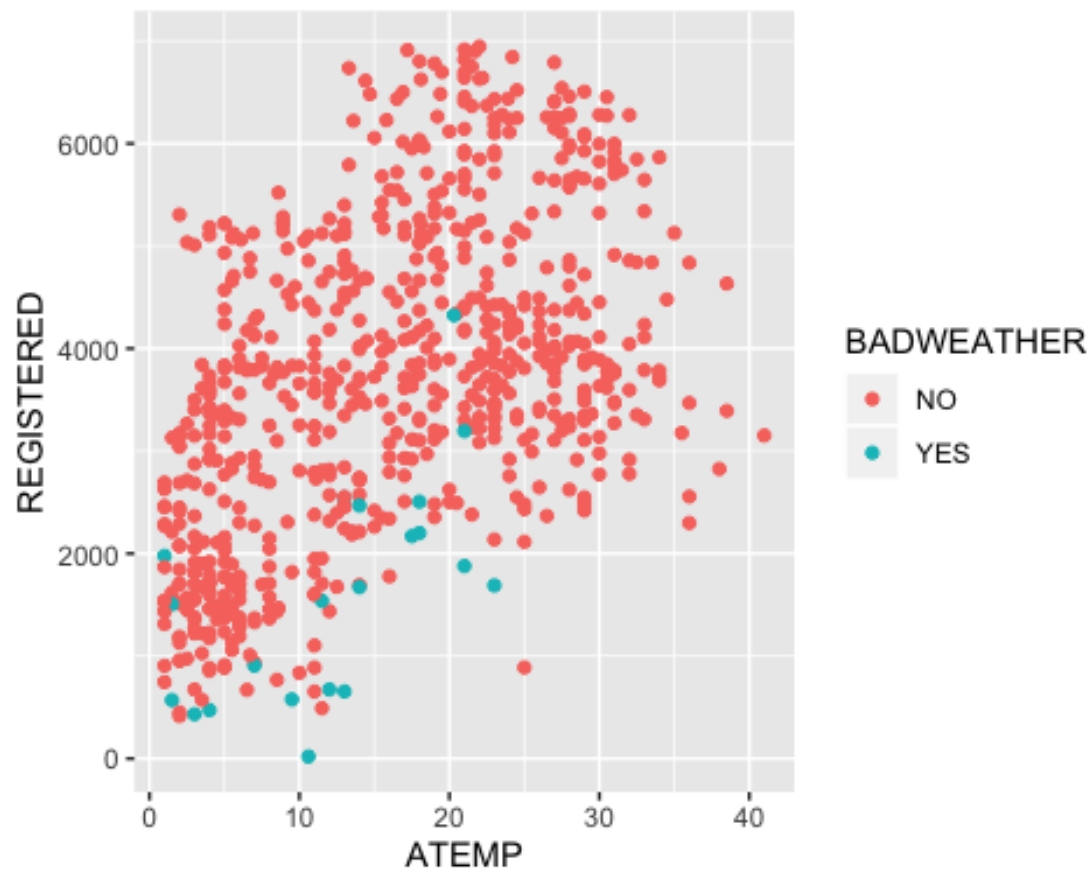
```
#3.c.iv
scat4 <- dfbOrg %>%
  ggplot(aes(x = ATEMP, y = COUNT)) + geom_point() + geom_smooth()
scat4

## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```
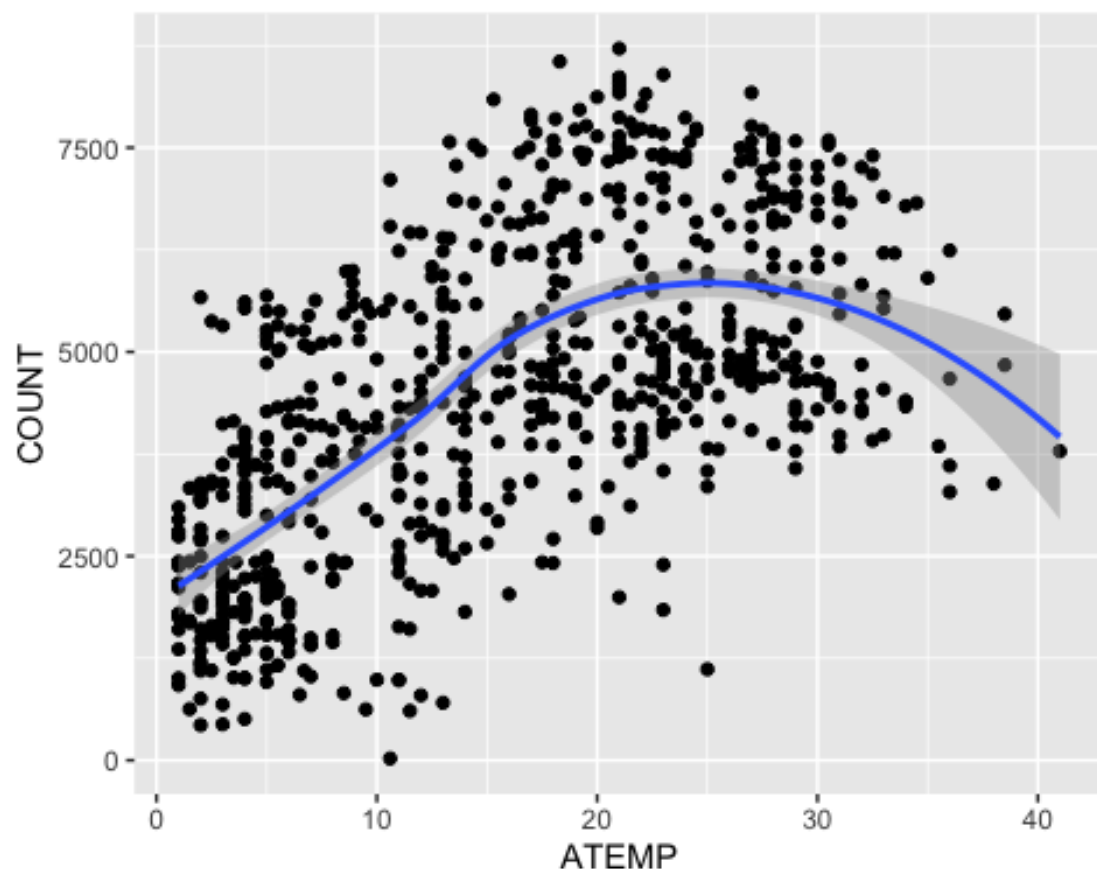
```r
regOrg <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
HUMIDITY, data = dfbOrg)
summary(regOrg)

##
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
##      HUMIDITY, data = dfbOrg)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3729.0 -1005.1  -190.3  1115.0  3750.1
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3967.981    335.628  11.823  < 2e-16 ***
## MONTHAugust  -209.660    291.004  -0.720  0.47147
## MONTHDecember  105.664   265.660   0.398  0.69094
## MONTHFebruary -802.319    273.000  -2.939  0.00340 **
## MONTHJanuary  -858.334    293.371  -2.926  0.00355 **
## MONTHJuly     -676.644    312.956  -2.162  0.03094 *
## MONTHJune     -189.229    286.067  -0.661  0.50851
```

```
## MONTHMarch        -242.020    249.333   -0.971   0.33204
## MONTHMay           279.730    259.634    1.077   0.28166
## MONTHNovember      651.966    257.460    2.532   0.01154 *
## MONTHOctober      1072.312    246.970    4.342 1.62e-05 ***
## MONTHSeptember     742.473    267.293    2.778   0.00562 **
## WEEKDAYYES          69.745    110.118    0.633   0.52670
## BADWEATHERYES    -1954.835    316.601   -6.174 1.11e-09 ***
## TEMP               184.596     42.011    4.394 1.28e-05 ***
## ATEMP              -48.640     36.621   -1.328   0.18454
## HUMIDITY           -25.341      3.623   -6.995 6.09e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1341 on 714 degrees of freedom
## Multiple R-squared:  0.5315, Adjusted R-squared:  0.521
## F-statistic: 50.64 on 16 and 714 DF,  p-value: < 2.2e-16

#5
diagnostics <- plot(regOrg)
```
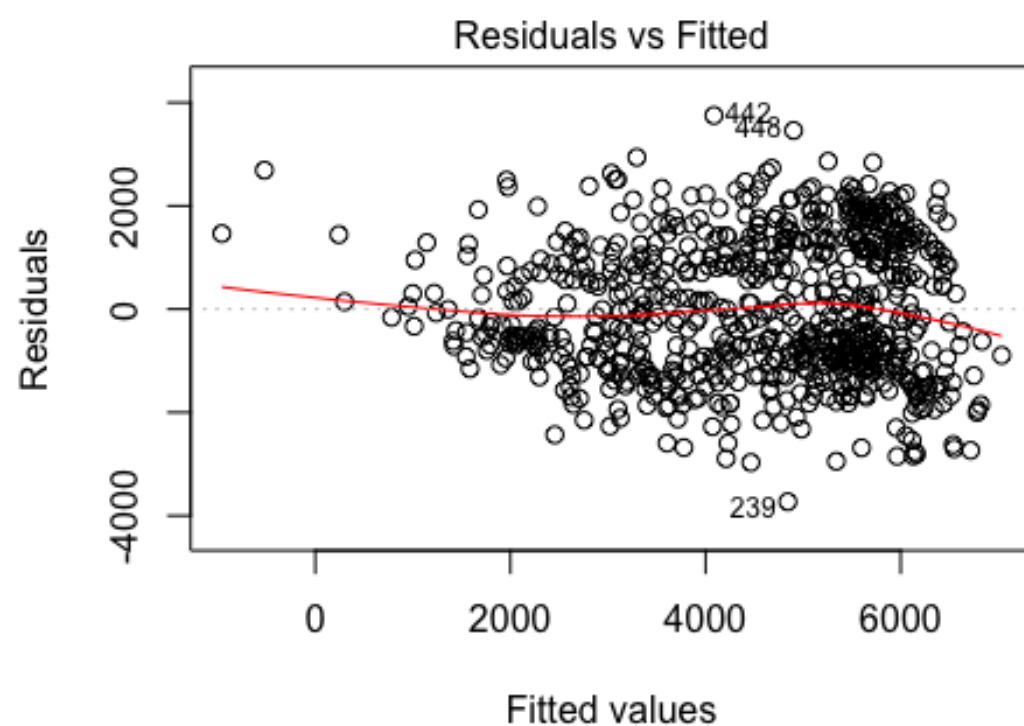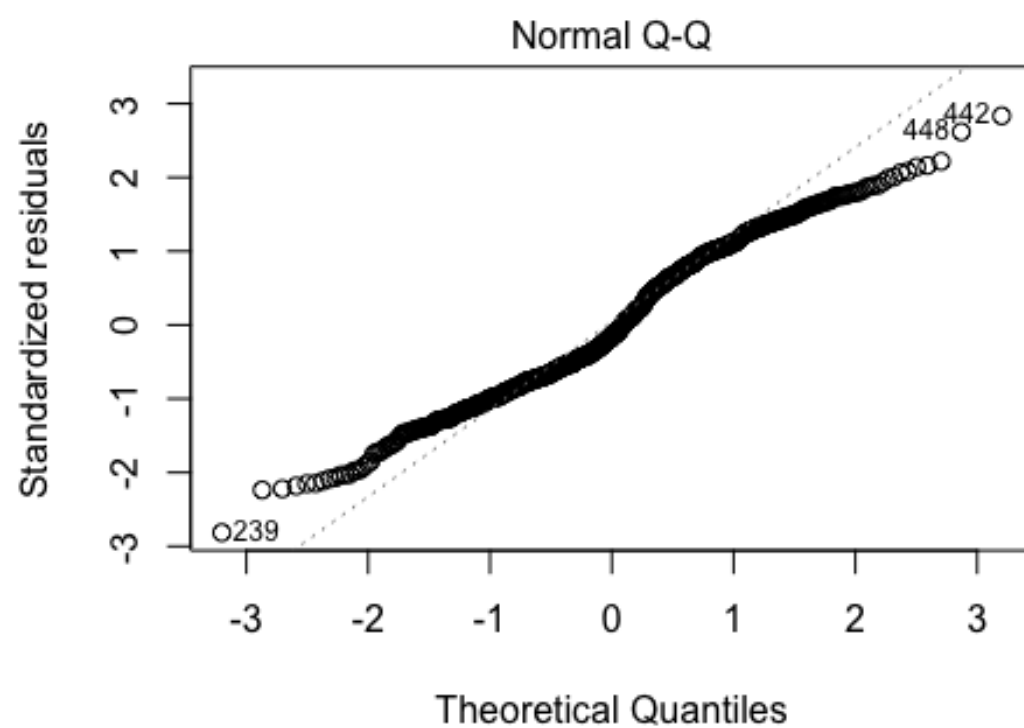
Residuals vs Fitted

Residuals

442
448
239

Fitted values
JNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +

Normal Q-Q

JNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +

Scale-Location

√|Standardized residuals|

Fitted values
JNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +

Residuals vs Leverage
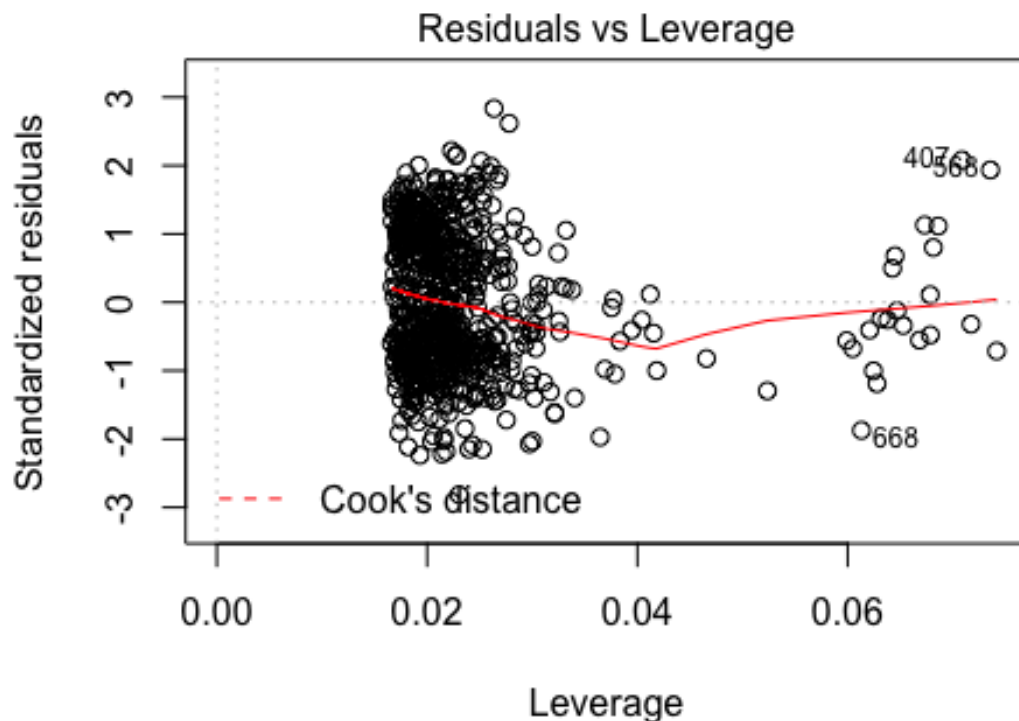
JNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +

```
car::vif(regOrg)

##                GVIF Df GVIF^(1/(2*Df))
## MONTH      8.480466 11        1.102049
## WEEKDAY    1.009743  1        1.004859
## BADWEATHER 1.137470  1        1.066522
## TEMP      55.856782  1        7.473739
## ATEMP     50.923158  1        7.136046
## HUMIDITY   1.275120  1        1.129212

regOrgCol <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + ATEMP +
HUMIDITY, data = dfbOrg)
summary(regOrgCol)

##
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + ATEMP + HUMIDITY,
##     data = dfbOrg)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3760.9 -1058.5  -207.5  1154.8  3822.9
##
## Coefficients:
```

```
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4503.4952   316.6962  14.220  < 2e-16 ***
## MONTHAugust       -70.1865   292.9479  -0.240  0.81072
## MONTHDecember       0.6468   267.9485   0.002  0.99807
## MONTHFebruary   -1016.9096   272.0127  -3.738  0.00020 ***
## MONTHJanuary    -1386.5736   271.0121  -5.116 4.01e-07 ***
## MONTHJuly        -585.3680   316.2385  -1.851  0.06458 .
## MONTHJune         -17.4214   286.9867  -0.061  0.95161
## MONTHMarch       -285.6783   252.3046  -1.132  0.25790
## MONTHMay          378.1598   261.9562   1.444  0.14929
## MONTHNovember     462.3246   257.0456   1.799  0.07250 .
## MONTHOctober     1033.8276   249.9540   4.136 3.95e-05 ***
## MONTHSeptember   841.6233   269.7273   3.120  0.00188 **
## WEEKDAYYES        91.4446   111.4065   0.821  0.41202
## BADWEATHERYES  -1961.8521   320.6243  -6.119 1.55e-09 ***
## ATEMP            103.1721    12.2943   8.392 2.55e-16 ***
## HUMIDITY         -25.4375     3.6686  -6.934 9.16e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1358 on 715 degrees of freedom
## Multiple R-squared:  0.5189, Adjusted R-squared:  0.5088
## F-statistic: 51.41 on 15 and 715 DF,  p-value: < 2.2e-16

#reducing multi collinearity
car::vif(regOrgCol)

##                 GVIF Df GVIF^(1/(2*Df))
## MONTH       6.353495 11        1.087679
## WEEKDAY     1.007712  1        1.003848
## BADWEATHER  1.137441  1        1.066509
## ATEMP       5.596197  1        2.365628
## HUMIDITY    1.275073  1        1.129191

#6
regBad <- lm(formula = COUNT ~ BADWEATHER, data = dfbOrg)
summary(regBad)

##
## Call:
## lm(formula = COUNT ~ BADWEATHER, data = dfbOrg)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -4153.2 -1257.7     1.8  1404.8  4129.8
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)     4584.24      70.63  64.908  < 2e-16 ***
## BADWEATHERYES  -2780.95     416.69  -6.674 4.93e-11 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1882 on 729 degrees of freedom
## Multiple R-squared:  0.05758,    Adjusted R-squared:  0.05629
## F-statistic: 44.54 on 1 and 729 DF,  p-value: 4.934e-11
```

#6.c
```
regBadWeekday <- lm(formula = COUNT ~ BADWEATHER*WEEKDAY, data = dfbOrg)
summary(regBadWeekday)

##
## Call:
## lm(formula = COUNT ~ BADWEATHER * WEEKDAY, data = dfbOrg)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -4206.7 -1262.1    -3.7  1405.3  4261.5
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                4452.5      131.5  33.861  < 2e-16 ***
## BADWEATHERYES             -2637.1      852.2  -3.095  0.00205 **
## WEEKDAYYES                  185.3      155.9   1.188  0.23514
## BADWEATHERYES:WEEKDAYYES   -201.2      977.1  -0.206  0.83695
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1883 on 727 degrees of freedom
## Multiple R-squared:  0.05941,    Adjusted R-squared:  0.05553
## F-statistic: 15.31 on 3 and 727 DF,  p-value: 1.15e-09
```

#7.a
```
set.seed(333)
```

#7.b
```
dfbTrain <- dfbOrg %>% sample_frac(0.8)
dfbTest <- dplyr::setdiff(dfbOrg, dfbTrain)
```

#7.c fitOrg
```
fitOrg <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
HUMIDITY, data = dfbTrain)
summary(fitOrg)

##
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
##     HUMIDITY, data = dfbTrain)
##
## Residuals:
##    Min     1Q Median     3Q    Max
##  -3696  -1027   -128   1131   3867
```

```
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4189.494    371.749  11.270  < 2e-16 ***
## MONTHAugust        -309.365    324.366  -0.954 0.340614
## MONTHDecember        46.563    294.392   0.158 0.874382
## MONTHFebruary      -923.390    304.763  -3.030 0.002558 **
## MONTHJanuary       -967.766    326.939  -2.960 0.003204 **
## MONTHJuly          -612.408    344.307  -1.779 0.075829 .
## MONTHJune          -227.634    310.489  -0.733 0.463773
## MONTHMarch         -451.147    277.753  -1.624 0.104871
## MONTHMay            245.195    286.788   0.855 0.392929
## MONTHNovember       590.822    291.562   2.026 0.043190 *
## MONTHOctober       1010.110    278.910   3.622 0.000319 ***
## MONTHSeptember      586.055    300.473   1.950 0.051615 .
## WEEKDAYYES           68.086    123.321   0.552 0.581096
## BADWEATHERYES     -2145.580    364.240  -5.891 6.59e-09 ***
## TEMP                175.738     48.247   3.642 0.000295 ***
## ATEMP               -43.247     42.066  -1.028 0.304355
## HUMIDITY            -26.261      4.057  -6.473 2.08e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1339 on 568 degrees of freedom
## Multiple R-squared:  0.5328, Adjusted R-squared:  0.5196
## F-statistic: 40.48 on 16 and 568 DF,  p-value: < 2.2e-16

resultsOrg <- dfbTest %>%
  mutate(predictedOrg = predict(fitOrg, dfbTest))

performanceOrg <- metric_set(rmse, mae)
performanceOrg(resultsOrg, truth = COUNT, estimate = predictedOrg)

## # A tibble: 2 x 3
##    .metric .estimator .estimate
##    <chr>   <chr>          <dbl>
## 1 rmse     standard       1358.
## 2 mae      standard       1153.

#fitNew
fitNew <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
HUMIDITY + WINDSPEED, data = dfbTrain)
summary(fitNew)

##
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
##     HUMIDITY + WINDSPEED, data = dfbTrain)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -3210.6 -1012.3  -156.4  1083.6  3517.2
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)      5488.298    430.937  12.736  < 2e-16 ***
## MONTHAugust      -424.317    316.802  -1.339 0.180985
## MONTHDecember    -176.926    289.712  -0.611 0.541645
## MONTHFebruary   -1026.291    297.598  -3.449 0.000605 ***
## MONTHJanuary    -1035.533    318.869  -3.248 0.001233 **
## MONTHJuly        -826.290    337.755  -2.446 0.014731 *
## MONTHJune        -368.085    303.654  -1.212 0.225947
## MONTHMarch       -491.403    270.796  -1.815 0.070104 .
## MONTHMay          138.378    280.163   0.494 0.621553
## MONTHNovember     443.200    285.392   1.553 0.120993
## MONTHOctober      847.305    273.396   3.099 0.002037 **
## MONTHSeptember    415.414    294.443   1.411 0.158838
## WEEKDAYYES         46.728    120.251   0.389 0.697728
## BADWEATHERYES   -1798.195    360.433  -4.989 8.08e-07 ***
## TEMP              192.631     47.120   4.088 4.98e-05 ***
## ATEMP             -60.573     41.116  -1.473 0.141246
## HUMIDITY          -32.522      4.111  -7.911 1.34e-14 ***
## WINDSPEED         -59.846     10.751  -5.567 4.01e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1305 on 567 degrees of freedom
## Multiple R-squared:  0.557,  Adjusted R-squared:  0.5437
## F-statistic: 41.93 on 17 and 567 DF,  p-value: < 2.2e-16

resultsNew <- dfbTest %>%
  mutate(predictedNew = predict(fitNew, dfbTest))

performanceNew <- metric_set(rmse, mae)
performanceNew(resultsNew, truth = COUNT, estimate = predictedNew)

## # A tibble: 2 x 3
##   .metric .estimator .estimate
##   <chr>   <chr>          <dbl>
## 1 rmse    standard       1315.
## 2 mae     standard       1133.

#8.
dfbTrain1 <- dfbOrg %>% filter(year(DATE) == 2011)
dfbTest1 <- dfbOrg %>% filter(year(DATE) == 2012)

# random
fitOrg1 <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
HUMIDITY, data = dfbTrain1)
summary(fitOrg1)
```

```
## 
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
##     HUMIDITY, data = dfbTrain1)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2894.67  -286.48    54.04   363.67  2061.53
## 
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3152.714    248.571  12.683  < 2e-16 ***
## MONTHAugust       499.693    199.955   2.499 0.012914 *
## MONTHDecember      98.991    178.106   0.556 0.578706
## MONTHFebruary   -1074.926    191.612  -5.610 4.13e-08 ***
## MONTHJanuary    -1253.748    219.656  -5.708 2.45e-08 ***
## MONTHJuly         464.458    220.241   2.109 0.035670 *
## MONTHJune         845.186    199.805   4.230 2.99e-05 ***
## MONTHMarch       -751.683    177.509  -4.235 2.93e-05 ***
## MONTHMay          934.792    172.461   5.420 1.11e-07 ***
## MONTHNovember     590.487    169.370   3.486 0.000552 ***
## MONTHOctober     1013.992    164.529   6.163 1.98e-09 ***
## MONTHSeptember    936.297    180.238   5.195 3.50e-07 ***
## WEEKDAYYES          8.987     74.359   0.121 0.903872
## BADWEATHERYES   -1419.036    184.526  -7.690 1.52e-13 ***
## TEMP               85.520     28.813   2.968 0.003204 **
## ATEMP             -24.672     24.702  -0.999 0.318588
## HUMIDITY          -12.838      2.476  -5.186 3.65e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 638.8 on 348 degrees of freedom
## Multiple R-squared:  0.7948, Adjusted R-squared:  0.7854
## F-statistic: 84.25 on 16 and 348 DF,  p-value: < 2.2e-16

resultsOrg1 <- dfbTest1 %>%
  mutate(predictedOrg1 = predict(fitOrg1, dfbTest1))

performanceOrg1 <- metric_set(rmse, mae)
performanceOrg1(resultsOrg1, truth = COUNT, estimate = predictedOrg1)

## # A tibble: 2 x 3
##   .metric .estimator .estimate
##   <chr>   <chr>          <dbl>
## 1 rmse    standard       2370.
## 2 mae     standard       2179.

# fixed date
dfbTrain1.5<- dfbOrg%>%
  filter(DATE >= "2011-01-01" & DATE <= "2012-06-30")
```

```
dfbTest1.5<- dfbOrg%>%
  filter(DATE >= "2012-07-01" & DATE <= "2012-12-31")

fitOrg1.5 <- lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP
+ HUMIDITY, data = dfbTrain1.5)
summary(fitOrg1.5)

##
## Call:
## lm(formula = COUNT ~ MONTH + WEEKDAY + BADWEATHER + TEMP + ATEMP +
##      HUMIDITY, data = dfbTrain1.5)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2788.7   -810.6    -80.4    786.0   3631.9
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3748.914    301.529  12.433  < 2e-16 ***
## MONTHAugust     -1505.946    285.315  -5.278 1.91e-07 ***
## MONTHDecember    -543.482    262.686  -2.069  0.03904 *
## MONTHFebruary    -758.310    230.069  -3.296  0.00105 **
## MONTHJanuary     -743.473    250.199  -2.972  0.00310 **
## MONTHJuly       -1714.360    308.676  -5.554 4.43e-08 ***
## MONTHJune        -176.338    244.357  -0.722  0.47083
## MONTHMarch       -246.853    206.759  -1.194  0.23304
## MONTHMay          258.702    217.650   1.189  0.23512
## MONTHNovember    -255.958    254.385  -1.006  0.31479
## MONTHOctober      -48.880    248.751  -0.197  0.84429
## MONTHSeptember   -601.362    268.788  -2.237  0.02568 *
## WEEKDAYYES        -50.188    104.846  -0.479  0.63236
## BADWEATHERYES   -1428.751    291.660  -4.899 1.28e-06 ***
## TEMP              231.361     37.120   6.233 9.36e-10 ***
## ATEMP             -90.002     32.379  -2.780  0.00564 **
## HUMIDITY          -22.092      3.307  -6.681 6.01e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1104 on 530 degrees of freedom
## Multiple R-squared:  0.5963, Adjusted R-squared:  0.5841
## F-statistic: 48.93 on 16 and 530 DF,  p-value: < 2.2e-16

resultsOrg1.5 <- dfbTest1.5 %>%
  mutate(predictedOrg1.5 = predict(fitOrg1.5, dfbTest1.5))

performanceOrg1.5 <- metric_set(rmse, mae)
performanceOrg1.5(resultsOrg1.5, truth = COUNT, estimate = predictedOrg1.5)
```

```
## # A tibble: 2 x 3
##   .metric .estimator .estimate
##   <chr>   <chr>          <dbl>
## 1 rmse    standard       2411.
## 2 mae     standard       2225.
```