

stat418 final project

Shu Jiang

5/27/2019

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.5.2
```

```
##
```

```
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
```

```
##
```

```
##      filter, lag
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
##      intersect, setdiff, setequal, union
```

```
library(plotrix)
```

```
## Warning: package 'plotrix' was built under R version 3.5.2
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.5.2
```

```
library(car)
```

```
## Warning: package 'car' was built under R version 3.5.2
```

```
## Loading required package: carData
```

```
##
```

```
## Attaching package: 'car'
```

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

```
##
```

```
##      recode
```

```
library(MASS)
```

```
## Warning: package 'MASS' was built under R version 3.5.2
```

```
##
```

```
## Attaching package: 'MASS'
```

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

```
##
```

```
##      select
```

```
#read csv file
```

```
movie<-read.csv('movie.csv')
```

```
#remove rows containing missing value
```

```
complete.cases(movie)
```

```
##      [1] TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
```

```
##      [12] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
```

```
##      [23] TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
```

##	[34]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[45]	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[56]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[67]	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[78]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[89]	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[100]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[111]	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[122]	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[133]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[144]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[155]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[166]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[177]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[188]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[199]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[210]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[221]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[232]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE
##	[243]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[254]	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[265]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[276]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[287]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[298]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[309]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[320]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[331]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[342]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[353]	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[364]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[375]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[386]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[397]	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[408]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[419]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE
##	[430]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[441]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[452]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[463]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[474]	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[485]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[496]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[507]	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[518]	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[529]	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[540]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[551]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[562]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[573]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[584]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[595]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[606]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[617]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE

##	[628]	FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[639]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[650]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[661]	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[672]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[683]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[694]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[705]	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[716]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[727]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[738]	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[749]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[760]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[771]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[782]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[793]	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[804]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[815]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[826]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[837]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[848]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[859]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[870]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[881]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[892]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[903]	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE
##	[914]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[925]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[936]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[947]	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[958]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[969]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[980]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[991]	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1002]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1013]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1024]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1035]	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1046]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE
##	[1057]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1068]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1079]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1090]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1101]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE
##	[1112]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1123]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[1134]	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1145]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1156]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1167]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[1178]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1189]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1200]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1211]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE

##	[1222]	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE
##	[1233]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1244]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[1255]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1266]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1277]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1288]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1299]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1310]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1321]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1332]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1343]	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1354]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1365]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1376]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1387]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[1398]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[1409]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1420]	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1431]	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1442]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1453]	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1464]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1475]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1486]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1497]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1508]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE
##	[1519]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1530]	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1541]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1552]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1563]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1574]	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[1585]	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1596]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1607]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1618]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1629]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1640]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1651]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1662]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1673]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1684]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[1695]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1706]	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE
##	[1717]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1728]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1739]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1750]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1761]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[1772]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1783]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1794]	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1805]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE

##	[1816]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1827]	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1838]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[1849]	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1860]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1871]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1882]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1893]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[1904]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[1915]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[1926]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[1937]	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1948]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1959]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[1970]	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[1981]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[1992]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE
##	[2003]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[2014]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2025]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[2036]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2047]	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2058]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2069]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2080]	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2091]	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2102]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2113]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2124]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[2135]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2146]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2157]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2168]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE
##	[2179]	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2190]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2201]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[2212]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2223]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[2234]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2245]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2256]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2267]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE
##	[2278]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2289]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2300]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2311]	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[2322]	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2333]	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2344]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE
##	[2355]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE
##	[2366]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2377]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2388]	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[2399]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE

##	[2410]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2421]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2432]	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2443]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
##	[2454]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2465]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2476]	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2487]	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE
##	[2498]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE
##	[2509]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2520]	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
##	[2531]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE
##	[2542]	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2553]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2564]	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2575]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2586]	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE
##	[2597]	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2608]	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2619]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2630]	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE
##	[2641]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE
##	[2652]	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE
##	[2663]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE
##	[2674]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[2685]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE
##	[2696]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2707]	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2718]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE
##	[2729]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2740]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2751]	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2762]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2773]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE
##	[2784]	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2795]	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE
##	[2806]	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
##	[2817]	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2828]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[2839]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2850]	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE
##	[2861]	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE
##	[2872]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE
##	[2883]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
##	[2894]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE
##	[2905]	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE
##	[2916]	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
##	[2927]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2938]	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2949]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
##	[2960]	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
##	[2971]	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE
##	[2982]	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE
##	[2993]	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

```

## [3004] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [3015] TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE
## [3026] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE
## [3037] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [3048] FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [3059] TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [3070] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [3081] TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [3092] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3103] TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [3114] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [3125] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3136] TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3147] TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [3158] TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [3169] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [3180] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3191] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [3202] TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [3213] FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [3224] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3235] TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3246] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [3257] TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [3268] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [3279] TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [3290] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3301] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [3312] FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [3323] TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [3334] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3345] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## [3356] FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3367] TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3378] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [3389] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE
## [3400] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE
## [3411] TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [3422] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE
## [3433] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [3444] TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE
## [3455] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE
## [3466] TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE
## [3477] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE
## [3488] FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [3499] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [3510] TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [3521] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3532] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [3543] FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [3554] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [3565] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [3576] TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [3587] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE

```

```

## [3598] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [3609] FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE
## [3620] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [3631] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE
## [3642] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [3653] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE
## [3664] FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [3675] TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [3686] TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [3697] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [3708] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [3719] TRUE FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE
## [3730] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [3741] FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [3752] FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE
## [3763] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [3774] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [3785] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3796] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [3807] TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [3818] FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [3829] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [3840] TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3851] FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [3862] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE
## [3873] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE
## [3884] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [3895] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [3906] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3917] TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE FALSE FALSE
## [3928] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [3939] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [3950] TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE
## [3961] TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [3972] FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [3983] TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [3994] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [4005] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [4016] FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [4027] FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [4038] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4049] FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [4060] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [4071] TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [4082] FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE
## [4093] FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [4104] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [4115] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [4126] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [4137] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4148] TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE
## [4159] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [4170] TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [4181] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE

```



```

## [4192] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4203] TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE
## [4214] FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4225] TRUE FALSE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [4236] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [4247] TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4258] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [4269] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [4280] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4291] FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE
## [4302] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [4313] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [4324] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE
## [4335] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [4346] FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE
## [4357] TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [4368] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [4379] TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE
## [4390] TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [4401] FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
## [4412] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE
## [4423] TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [4434] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE
## [4445] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE
## [4456] TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [4467] TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [4478] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE
## [4489] FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [4500] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE
## [4511] FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [4522] TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [4533] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [4544] TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE FALSE
## [4555] TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4566] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [4577] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4588] TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [4599] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## [4610] TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [4621] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [4632] TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4643] TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE
## [4654] FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [4665] FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [4676] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [4687] FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [4698] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [4709] FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [4720] TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [4731] TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE
## [4742] TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE
## [4753] FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [4764] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [4775] TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE

```

```

## [4786] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [4797] TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE
## [4808] FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [4819] FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [4830] FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [4841] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE
## [4852] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE
## [4863] FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE
## [4874] FALSE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [4885] FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE
## [4896] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [4907] TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE
## [4918] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [4929] FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE
## [4940] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE
## [4951] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [4962] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE
## [4973] FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE
## [4984] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [4995] TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE
## [5006] TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [5017] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [5028] FALSE TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [5039] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [5050] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [5061] TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [5072] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [5083] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [5094] TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE
## [5105] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [5116] TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [5127] FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE
## [5138] TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE TRUE
## [5149] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [5160] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE
## [5171] FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [5182] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [5193] TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [5204] TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE
## [5215] FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE
## [5226] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [5237] FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE
## [5248] TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE
## [5259] FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [5270] TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [5281] TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [5292] TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE
## [5303] TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [5314] TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [5325] TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE
## [5336] FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [5347] TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [5358] FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [5369] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE

```

```

## [5380] TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [5391] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [5402] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [5413] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [5424] TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE
## [5435] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE
## [5446] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [5457] FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE
## [5468] FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [5479] FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [5490] FALSE TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE
## [5501] TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE
## [5512] FALSE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE FALSE
## [5523] FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [5534] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [5545] FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [5556] FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [5567] FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE FALSE
## [5578] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [5589] FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## [5600] FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE
## [5611] TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE FALSE FALSE FALSE
## [5622] FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE TRUE
## [5633] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [5644] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [5655] TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [5666] TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE
## [5677] TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [5688] TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE
## [5699] TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [5710] TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [5721] TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [5732] FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [5743] FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [5754] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [5765] TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [5776] TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE
## [5787] TRUE FALSE TRUE FALSE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## [5798] FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [5809] TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE FALSE
## [5820] TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE
## [5831] TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE
## [5842] TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE
## [5853] FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [5864] FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [5875] FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE
## [5886] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [5897] TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE
## [5908] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE
## [5919] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [5930] FALSE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE
## [5941] TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [5952] TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [5963] FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE

```

```

## [5974] TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [5985] TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## [5996] FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [6007] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [6018] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [6029] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [6040] TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [6051] TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [6062] TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [6073] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [6084] FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE
## [6095] TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [6106] TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE
## [6117] FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE
## [6128] TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE
## [6139] FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE
## [6150] TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [6161] TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [6172] TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [6183] FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [6194] TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [6205] TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [6216] FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [6227] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [6238] TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE
## [6249] FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE
## [6260] FALSE TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [6271] FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE
## [6282] FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE
## [6293] FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [6304] TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [6315] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [6326] TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE
## [6337] FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE
## [6348] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [6359] FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE
## [6370] TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE
## [6381] FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE
## [6392] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [6403] TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [6414] FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [6425] TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [6436] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE FALSE
## [6447] FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE
## [6458] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [6469] FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE
## [6480] TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [6491] TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [6502] TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE
## [6513] FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [6524] FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [6535] FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE
## [6546] TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE
## [6557] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE FALSE

```

```

## [6568] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [6579] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE
## [6590] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [6601] TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [6612] TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [6623] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE
## [6634] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [6645] TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE
## [6656] TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [6667] FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [6678] FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [6689] TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [6700] TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE
## [6711] FALSE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE FALSE TRUE
## [6722] FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [6733] FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE
## [6744] FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [6755] FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [6766] TRUE FALSE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE
## [6777] TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE
## [6788] FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [6799] TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE
## [6810] TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE
## [6821] FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [6832] TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE
## [6843] TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [6854] TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [6865] TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [6876] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [6887] FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE
## [6898] TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE
## [6909] TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [6920] TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE
## [6931] TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [6942] TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE
## [6953] FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [6964] TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE
## [6975] FALSE FALSE FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [6986] FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [6997] FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE
## [7008] FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE
## [7019] FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE
## [7030] TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [7041] FALSE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE TRUE
## [7052] TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE TRUE
## [7063] FALSE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [7074] FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE
## [7085] TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [7096] FALSE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [7107] TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE
## [7118] TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE
## [7129] TRUE TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE TRUE
## [7140] TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [7151] TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE

```

```

## [7162] FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [7173] FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [7184] FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [7195] FALSE TRUE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE
## [7206] TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [7217] FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE
## [7228] TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [7239] TRUE FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE TRUE
## [7250] TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE
## [7261] FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [7272] TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [7283] FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE
## [7294] TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [7305] TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [7316] FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [7327] FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE
## [7338] TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [7349] FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE
## [7360] TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [7371] TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE
## [7382] FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE
## [7393] FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [7404] TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE
## [7415] TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE
## [7426] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE
## [7437] FALSE FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE
## [7448] FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE
## [7459] FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [7470] TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [7481] FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE
## [7492] FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [7503] TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE
## [7514] TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE
## [7525] TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE
## [7536] TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [7547] TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE
## [7558] TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE
## [7569] TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [7580] TRUE FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE
## [7591] FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [7602] TRUE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [7613] FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE FALSE TRUE
## [7624] FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [7635] TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE TRUE FALSE FALSE
## [7646] TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [7657] TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
## [7668] FALSE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [7679] TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE FALSE
## [7690] TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE
## [7701] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [7712] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
## [7723] FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [7734] TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE TRUE
## [7745] TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE

```

```

## [7756] FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE
## [7767] TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE
## [7778] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [7789] TRUE TRUE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE
## [7800] FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [7811] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE
## [7822] TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE
## [7833] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [7844] FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE
## [7855] TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [7866] FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE
## [7877] TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE
## [7888] TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE
## [7899] FALSE FALSE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE FALSE
## [7910] TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE
## [7921] FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE FALSE
## [7932] TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE
## [7943] TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [7954] FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [7965] FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE
## [7976] FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE
## [7987] TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [7998] FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE
## [8009] FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [8020] TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE TRUE
## [8031] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [8042] TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE FALSE
## [8053] TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [8064] TRUE FALSE TRUE FALSE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [8075] TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE FALSE
## [8086] FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [8097] FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [8108] TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE
## [8119] TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE
## [8130] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE
## [8141] TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [8152] FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE FALSE TRUE
## [8163] TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE TRUE
## [8174] TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE
## [8185] TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE
## [8196] FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE
## [8207] FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## [8218] TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE TRUE
## [8229] FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [8240] FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE TRUE
## [8251] FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE
## [8262] TRUE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE
## [8273] FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE
## [8284] FALSE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [8295] TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [8306] FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE
## [8317] TRUE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE TRUE
## [8328] FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [8339] TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE

```

```

## [8350] FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [8361] FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE TRUE
## [8372] FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [8383] FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE
## [8394] TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE
## [8405] FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE
## [8416] FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [8427] TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE
## [8438] FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE TRUE
## [8449] TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE
## [8460] TRUE FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE TRUE
## [8471] TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE
## [8482] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE
## [8493] FALSE TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE FALSE
## [8504] TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE
## [8515] TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE
## [8526] FALSE FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE
## [8537] TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [8548] FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [8559] TRUE FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE
## [8570] TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE FALSE
## [8581] TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [8592] FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
## [8603] TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE
## [8614] FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [8625] FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [8636] TRUE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE
## [8647] FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [8658] TRUE FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE TRUE
## [8669] FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE
## [8680] TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE
## [8691] FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [8702] FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [8713] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [8724] TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE
## [8735] FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE FALSE FALSE FALSE
## [8746] FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE
## [8757] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [8768] FALSE FALSE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE
## [8779] FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE
## [8790] FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [8801] TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE
## [8812] FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [8823] TRUE TRUE TRUE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE
## [8834] TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE
## [8845] FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE TRUE
## [8856] FALSE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [8867] TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE
## [8878] FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE
## [8889] TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE
## [8900] TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE TRUE
## [8911] FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [8922] TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [8933] FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE

```



```

## [8944] FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE
## [8955] FALSE TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE
## [8966] TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [8977] TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE
## [8988] TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE
## [8999] TRUE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [9010] TRUE TRUE FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE
## [9021] TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE
## [9032] FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE TRUE TRUE
## [9043] FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [9054] TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE FALSE FALSE
## [9065] TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE
## [9076] TRUE FALSE TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE
## [9087] FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE
## [9098] FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE FALSE
## [9109] TRUE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE
## [9120] FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
## [9131] FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE FALSE
## [9142] TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE FALSE
## [9153] FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE FALSE TRUE
## [9164] FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE FALSE
## [9175] FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
## [9186] TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE FALSE FALSE
## [9197] FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE
## [9208] TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE
## [9219] TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE
## [9230] FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [9241] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [9252] FALSE TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE TRUE FALSE
## [9263] FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE TRUE
## [9274] TRUE TRUE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE
## [9285] TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE TRUE
## [9296] TRUE TRUE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE TRUE
## [9307] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [9318] FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE
## [9329] TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [9340] FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE
## [9351] TRUE FALSE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [9362] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE
## [9373] TRUE TRUE FALSE TRUE TRUE FALSE FALSE TRUE FALSE TRUE FALSE
## [9384] FALSE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE TRUE FALSE
## [9395] FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE FALSE
## [9406] FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE
## [9417] TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [9428] TRUE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE
## [9439] TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE FALSE TRUE
## [9450] TRUE TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [9461] TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [9472] TRUE TRUE FALSE TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE
## [9483] FALSE TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE TRUE
## [9494] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE
## [9505] FALSE FALSE FALSE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [9516] FALSE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE TRUE
## [9527] TRUE FALSE FALSE TRUE FALSE TRUE TRUE FALSE FALSE FALSE TRUE

```

```
## [9538] FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [9549] FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [9560] TRUE FALSE FALSE FALSE TRUE TRUE TRUE FALSE TRUE FALSE TRUE
## [9571] FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE FALSE FALSE TRUE
## [9582] FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE FALSE FALSE
## [9593] TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE
## [9604] FALSE FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE
## [9615] FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE
## [9626] FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE TRUE FALSE FALSE
## [9637] FALSE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE TRUE FALSE
## [9648] TRUE FALSE FALSE FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE
## [9659] TRUE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE
## [9670] TRUE FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [9681] FALSE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE FALSE FALSE
## [9692] FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE TRUE
## [9703] FALSE FALSE TRUE FALSE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [9714] FALSE TRUE TRUE FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE
## [9725] FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE TRUE FALSE TRUE
## [9736] TRUE TRUE FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE
## [9747] TRUE TRUE TRUE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE
## [9758] FALSE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE TRUE TRUE
## [9769] FALSE FALSE TRUE FALSE TRUE TRUE FALSE TRUE FALSE TRUE FALSE
## [9780] FALSE FALSE TRUE FALSE TRUE TRUE TRUE TRUE FALSE FALSE TRUE
## [9791] FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE TRUE FALSE TRUE
## [9802] FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE TRUE TRUE FALSE
## [9813] TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [9824] TRUE TRUE FALSE FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE
## [9835] FALSE FALSE FALSE FALSE TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## [9846] FALSE TRUE TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE
## [9857] FALSE FALSE TRUE TRUE FALSE TRUE TRUE FALSE TRUE TRUE TRUE
## [9868] TRUE TRUE TRUE FALSE TRUE TRUE TRUE TRUE FALSE TRUE FALSE
## [9879] FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE FALSE TRUE
## [9890] FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE TRUE TRUE TRUE
## [9901] FALSE FALSE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE
## [9912] FALSE FALSE TRUE TRUE FALSE FALSE TRUE TRUE TRUE FALSE FALSE
## [9923] FALSE FALSE FALSE FALSE TRUE FALSE TRUE TRUE FALSE FALSE TRUE
## [9934] TRUE FALSE TRUE TRUE TRUE FALSE FALSE TRUE FALSE FALSE FALSE
## [9945] TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE TRUE TRUE FALSE
## [9956] FALSE TRUE FALSE FALSE FALSE TRUE TRUE FALSE FALSE FALSE FALSE
## [9967] FALSE FALSE FALSE TRUE FALSE FALSE TRUE FALSE FALSE TRUE TRUE
## [9978] FALSE FALSE TRUE FALSE TRUE FALSE FALSE TRUE TRUE FALSE FALSE
## [9989] TRUE TRUE TRUE FALSE TRUE TRUE TRUE FALSE TRUE FALSE FALSE
## [10000] TRUE
```

```
df<-movie[complete.cases(movie),]
str(df)
```

```
## 'data.frame':    6506 obs. of  10 variables:
## $ X              : int  0 1 2 12 13 14 15 16 17 21 ...
## $ Name           : Factor w/ 9644 levels ";Three Amigos!",...: 777 3823 5540 6686 6225 4341 3821 777
## $ Year           : int  2019 2019 2019 2019 2019 2019 2019 2014 2019 2018 2019 ...
## $ Level          : Factor w/ 18 levels "Approved","G",...: 10 11 9 7 10 11 11 10 10 10 ...
## $ Duration       : Factor w/ 172 levels " ","100 min",...: 83 33 6 47 34 27 3 166 51 25 ...
## $ Genre          : Factor w/ 479 levels "Action","Action Adventure",...: 13 44 4 244 4 288 44 221 1
## $ Score          : num  8.8 8.1 7 2.1 7.5 7.2 7.4 5.2 8.5 7.1 ...
```

```
## $ Director      : Factor w/ 4416 levels "A.L. Vijay","A.R. Murugadoss",...: 306 664 3509 3371 978 :
## $ Votes         : int   415517 53876 37883 9311 103107 11068 441316 5068 662293 268658 ...
## $ Gross_in_Million: num   781.332 76.639 102.823 0.779 138.236 ...
```

```
df<-na.omit(movie)
#remove unrelated and unrated movie level
newmovie<-df[which((df$Level == "PG") | (df$Level == "R") | (df$Level == "PG-13")), ]
attach(newmovie)
is.vector(newmovie$Genre)
```

```
## [1] FALSE
```

```
Genre<-as.character(Genre)
genre1<-strsplit(Genre, split=" ")
class(genre1)
```

```
## [1] "list"
```

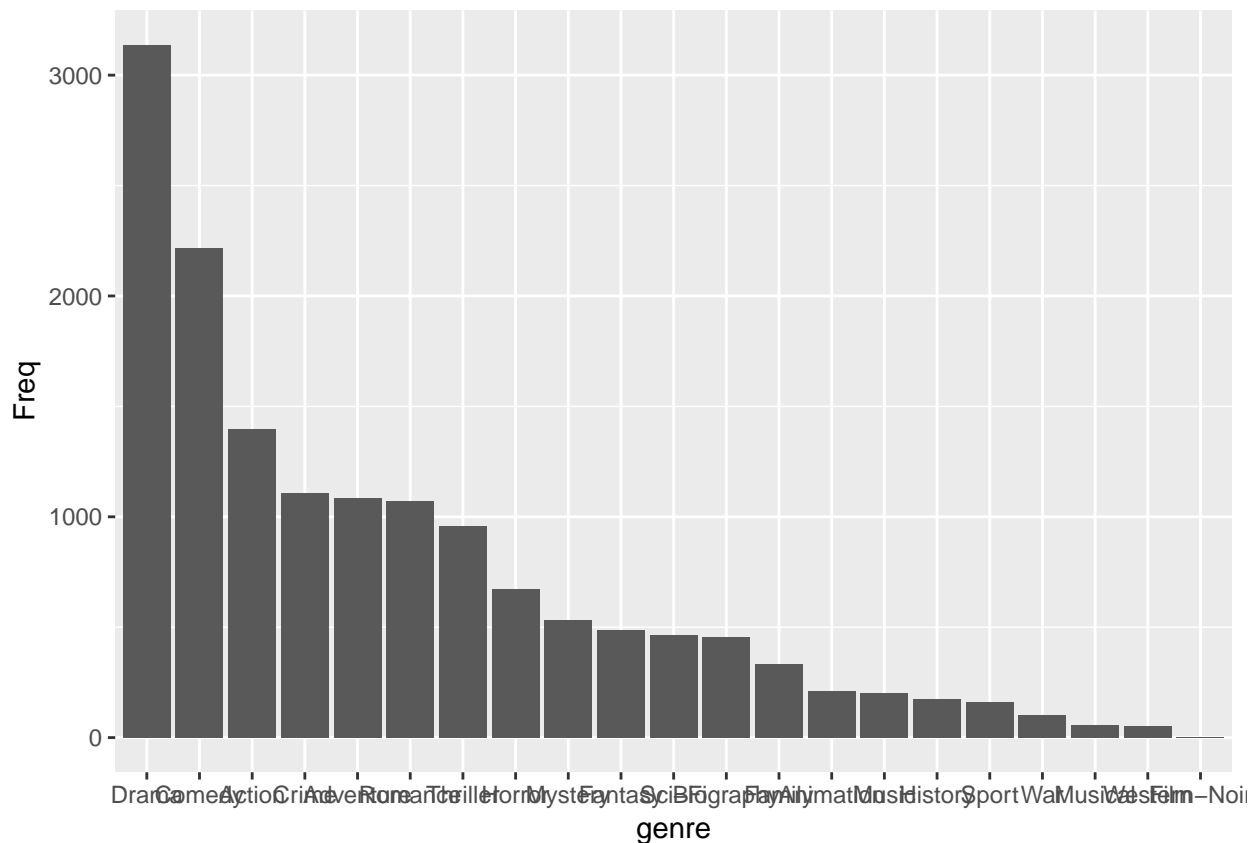
```
genre2<-unlist(genre1, use.names=FALSE)
class(genre2)
```

```
## [1] "character"
```

```
table(genre2)
```

```
## genre2
##      Action Adventure Animation Biography      Comedy      Crime      Drama
##      1398      1084       211       454      2218      1109      3137
##      Family   Fantasy Film-Noir   History   Horror     Music    Musical
##      333       488        2       174       671       203        56
##      Mystery   Romance   Sci-Fi    Sport  Thriller     War     Western
##      533       1069       464       161       960       102        51
```

```
freq <- data.frame(table(genre2))
freq$genre <- factor(freq$genre, levels = freq$genre[order(-freq$Freq)])
ggplot(freq, aes(x=genre, y=Freq)) + geom_bar(stat="identity")
```



```
#create new dummy variables
newmovie$Action<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Action[i]<-ifelse("Action" %in% genre1[[i]], 1,0)
}

newmovie$Adventure<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Adventure[i]<-ifelse("Adventure" %in% genre1[[i]], 1,0)
}

newmovie$Animation<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Animation[i]<-ifelse("Animation" %in% genre1[[i]], 1,0)
}

newmovie$Biography<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Biography[i]<-ifelse("Biography" %in% genre1[[i]], 1,0)
}

newmovie$Comedy<-vector(mode="numeric", length=5809)
for(i in 1:5809)
```

```

{
  newmovie$Comedy[i]<-ifelse("Comedy" %in% genre1[[i]], 1,0)
}

newmovie$Crime<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Crime[i]<-ifelse("Crime" %in% genre1[[i]], 1,0)
}

newmovie$Drama<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Drama[i]<-ifelse("Drama" %in% genre1[[i]], 1,0)
}

newmovie$Family<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Family[i]<-ifelse("Family" %in% genre1[[i]], 1,0)
}

newmovie$Fantasy<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Fantasy[i]<-ifelse("Fantasy" %in% genre1[[i]], 1,0)
}

newmovie$Film_Noir<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Film_Noir[i]<-ifelse("Film-Noir" %in% genre1[[i]], 1,0)
}

newmovie$History<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$History[i]<-ifelse("History" %in% genre1[[i]], 1,0)
}

newmovie$Horror<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Horror[i]<-ifelse("Horror" %in% genre1[[i]], 1,0)
}

newmovie$Music<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Music[i]<-ifelse("Music" %in% genre1[[i]], 1,0)
}

newmovie$Musical<-vector(mode="numeric", length=5809)

```

```

for(i in 1:5809)
{
  newmovie$Musical[i]<-ifelse("Musical" %in% genre1[[i]], 1,0)
}

newmovie$Mystery<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Mystery[i]<-ifelse("Mystery" %in% genre1[[i]], 1,0)
}

newmovie$Romance<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Romance[i]<-ifelse("Romance" %in% genre1[[i]], 1,0)
}

newmovie$Sci_Fi<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Sci_Fi[i]<-ifelse("Sci-Fi" %in% genre1[[i]], 1,0)
}

newmovie$Sport<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Sport[i]<-ifelse("Sport" %in% genre1[[i]], 1,0)
}

newmovie$Thriller<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Thriller[i]<-ifelse("Thriller" %in% genre1[[i]], 1,0)
}

newmovie$War<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$War[i]<-ifelse("War" %in% genre1[[i]], 1,0)
}

newmovie$Western<-vector(mode="numeric", length=5809)
for(i in 1:5809)
{
  newmovie$Western[i]<-ifelse("Western" %in% genre1[[i]], 1,0)
}

#reclassify Duration
newmovie$new_Duration<-as.character(Duration)
newmovie$new_Duration<-strsplit(newmovie$new_Duration, split=" ")
for (i in 1:5809)
{
  newmovie$new_Duration[i]<-newmovie$new_Duration[[i]][1]
}

```

```

newmovie$new_Duration<-unlist(newmovie$new_Duration)
newmovie$newduration<-as.integer(newmovie$new_Duration)
newmovie$final_Duration<-ifelse(newmovie$newduration <= 100, "Short", ifelse(newmovie$newduration >=100, "Long", "Normal"))
table(newmovie$final_Duration)

##
##   Long Normal  Short
##  1222   2430   2157

#reclassify Year
table(newmovie$Year)

##
## 1927 1938 1939 1941 1942 1951 1952 1954 1955 1956 1957 1958 1960 1961 1962
##    1    1    1    1    1    3    1    2    1    2    1    2    3    1    2
## 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977
##    2    5    3    4    6    5    6    5    6    7   18   16   19   20   21
## 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992
##   28   29   38   58   51   64   81   90   93   92  101   92   97   88   99
## 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
##  121  113  121  118  131  129  125  124  148  162  150  161  180  192  175
## 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
##  190  198  185  196  182  217  227  207  241  234  257   58

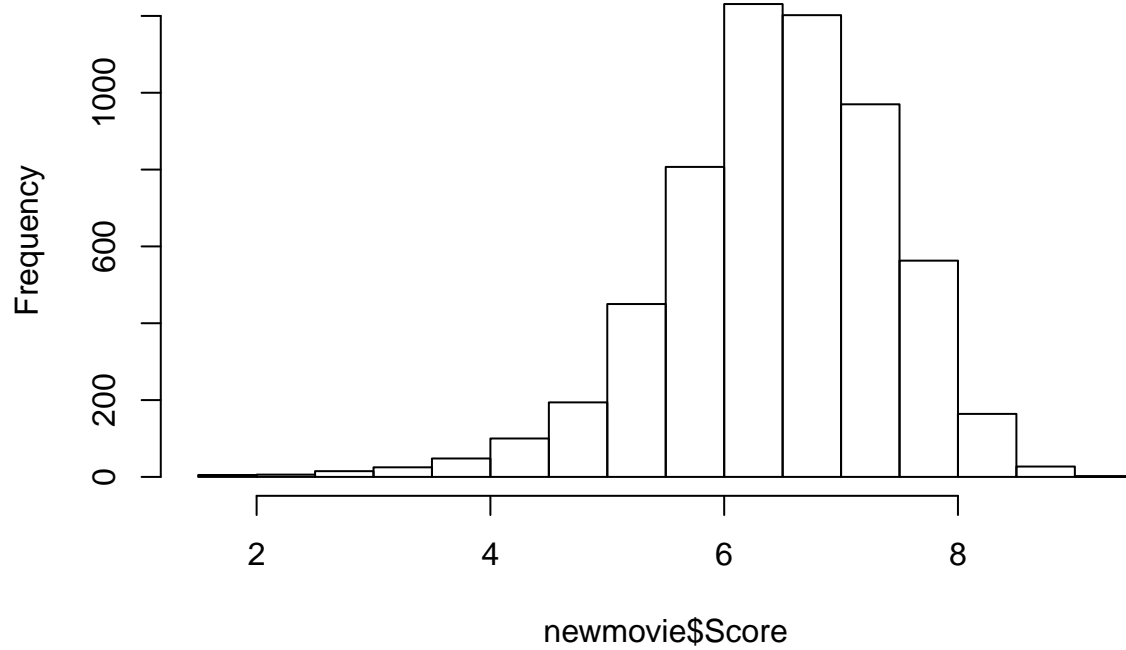
newmovie$new_Year<-ifelse(newmovie$Year >= 1927 & newmovie$Year <= 1999, "before2000", ifelse(newmovie$Year >= 2000, "first_ten", "second_ten"))
table(newmovie$new_Year)

##
## before2000  first_ten second_ten
##        2125        1865        1819

#check normality of numerical variables and do log transformation to variables that are not normal
hist(newmovie$Score)

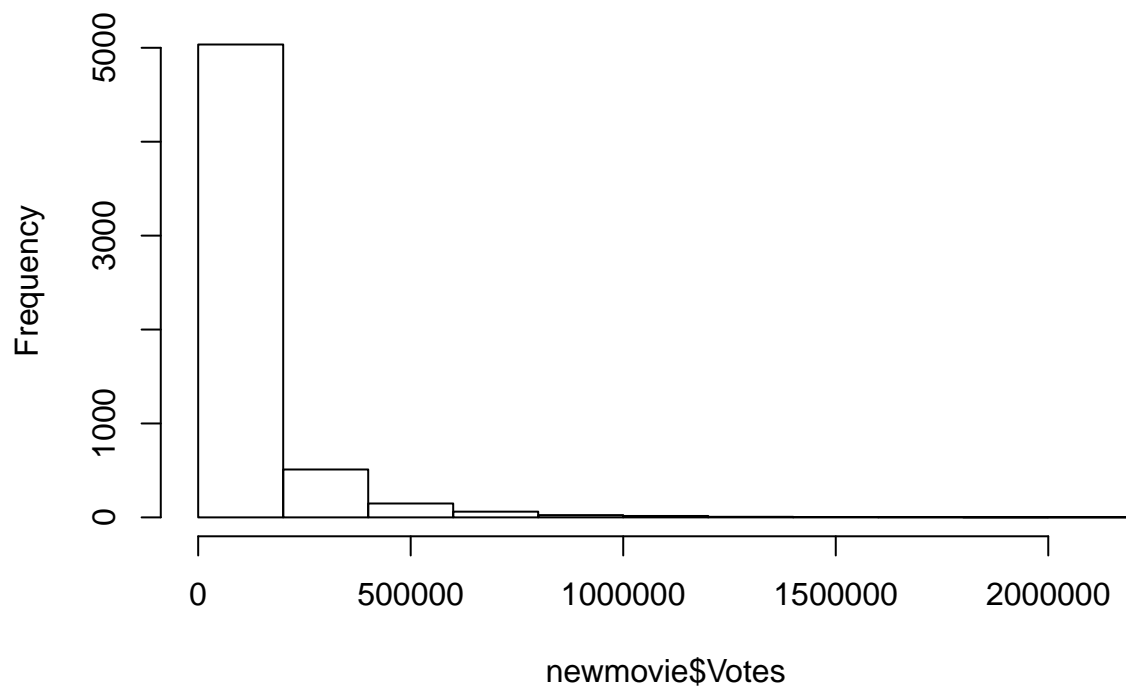
```

Histogram of newmovie\$Score



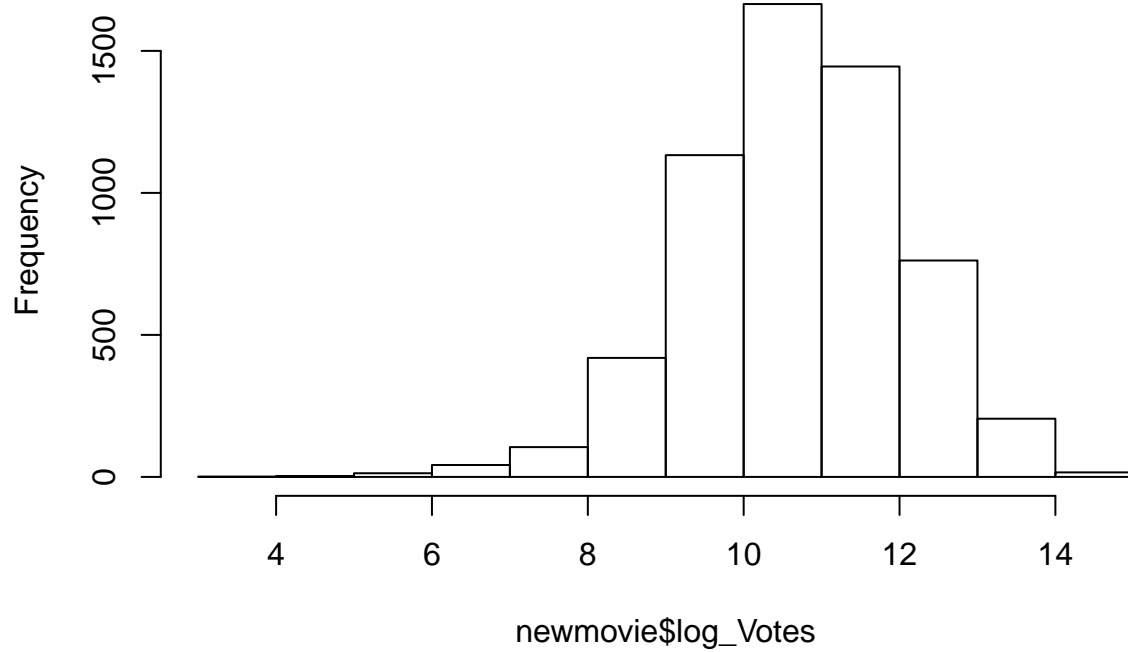
```
hist(newmovie$Votes)
```

Histogram of newmovie\$Votes



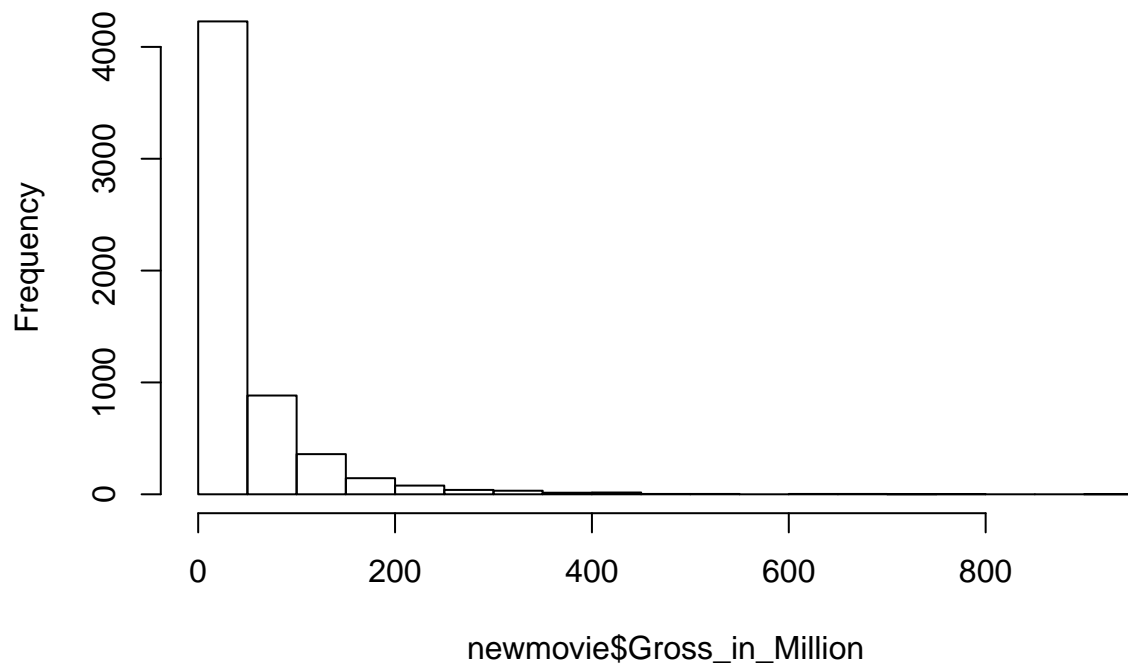
```
newmovie$log_Votes<-log(newmovie$Votes+1)  
hist(newmovie$log_Votes)
```


Histogram of newmovie\$log_Votes



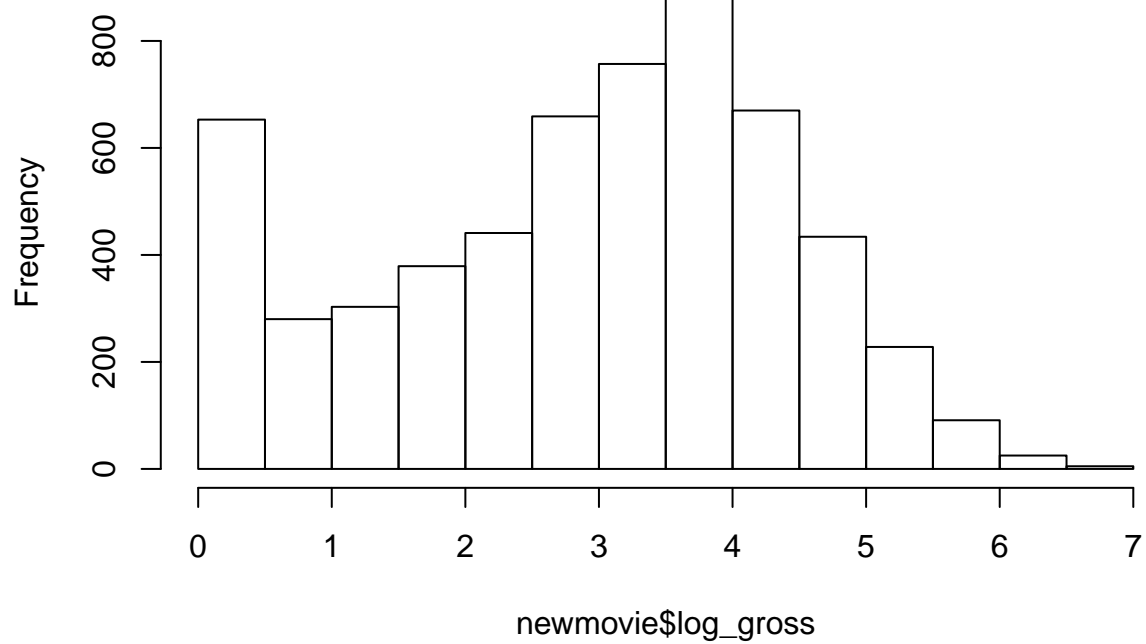
```
hist(newmovie$Gross_in_Million)
```

Histogram of newmovie\$Gross_in_Million

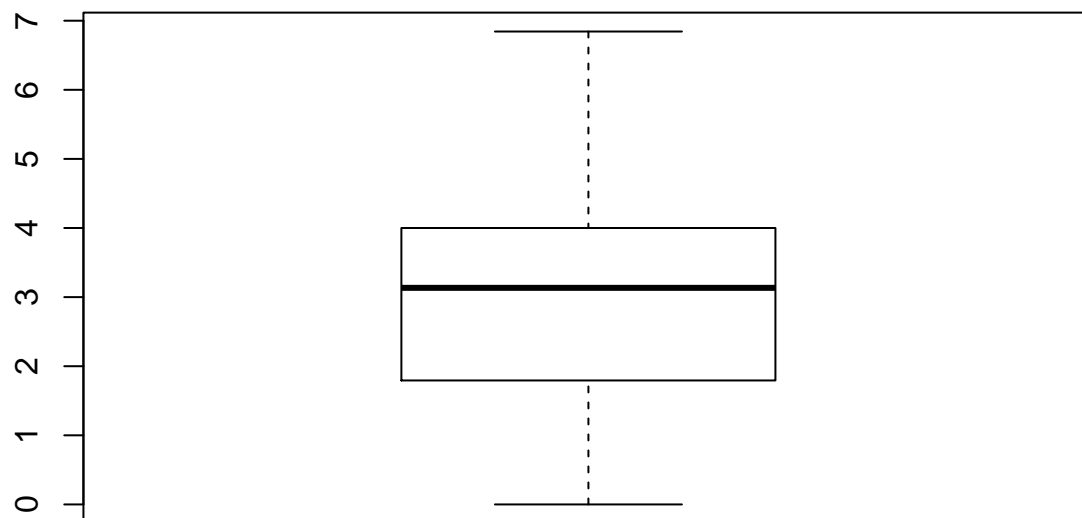


```
newmovie$log_gross<-log(newmovie$Gross_in_Million+1)  
hist(newmovie$log_gross)
```

Histogram of newmovie\$log_gross

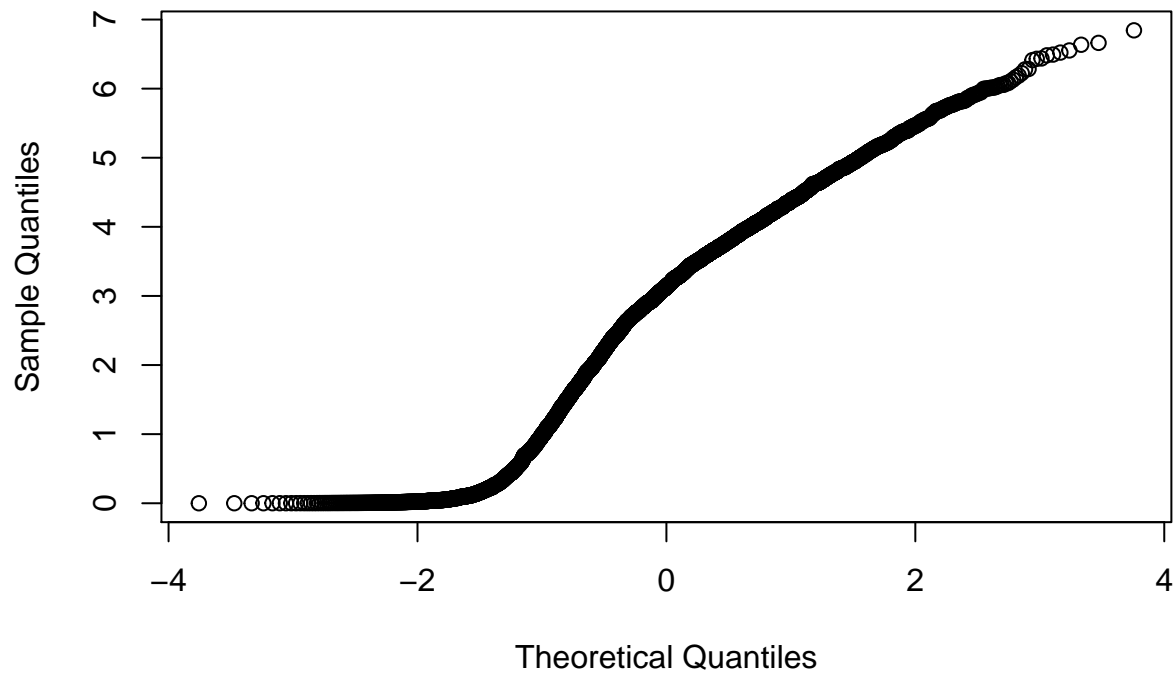


```
boxplot(newmovie$log_gross)
```

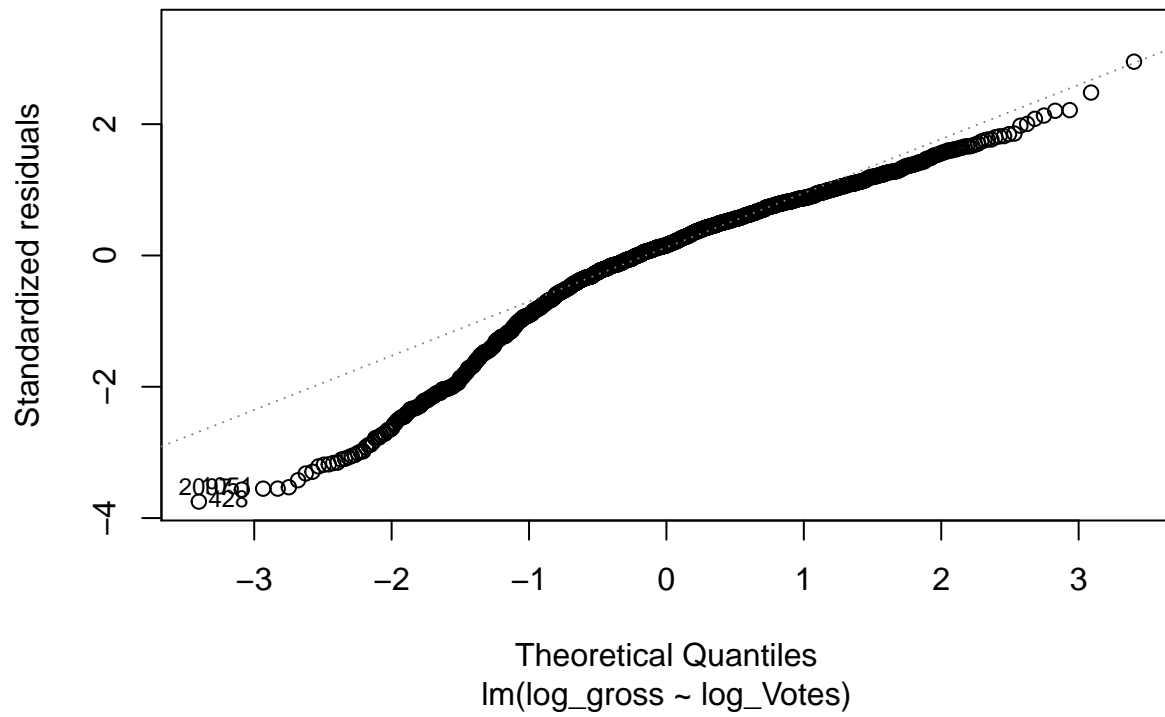
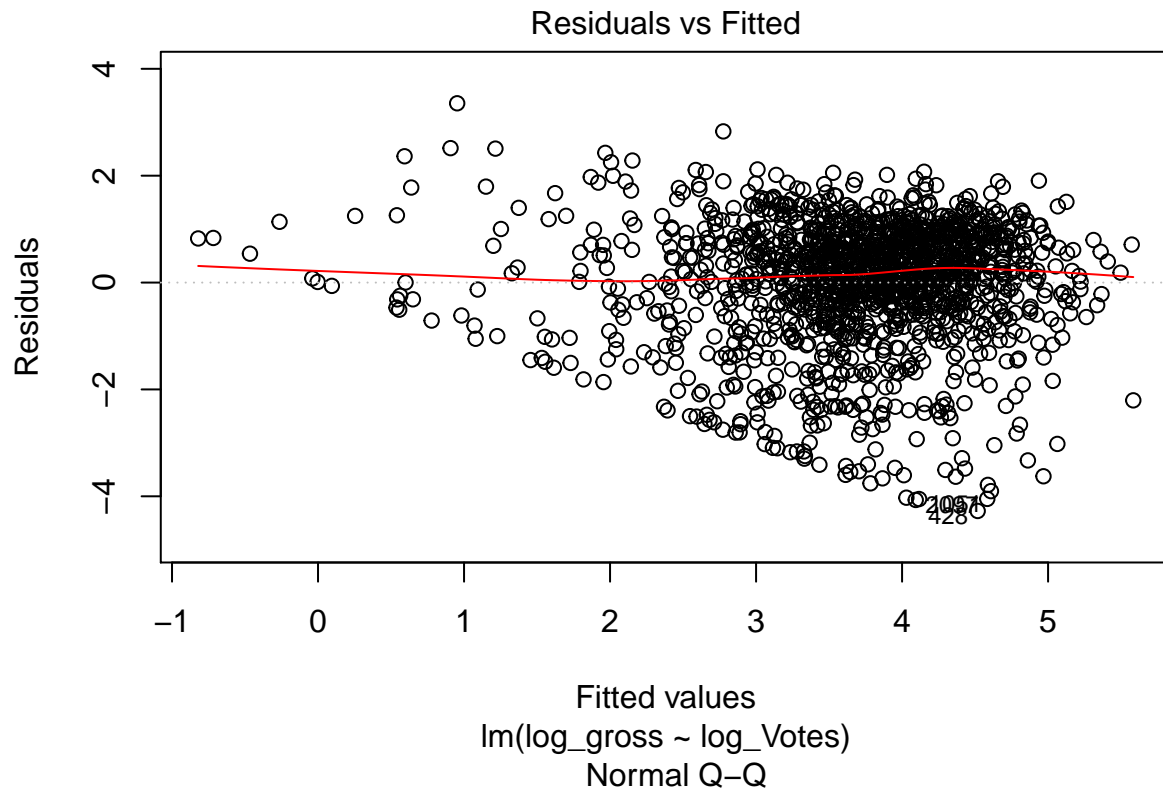


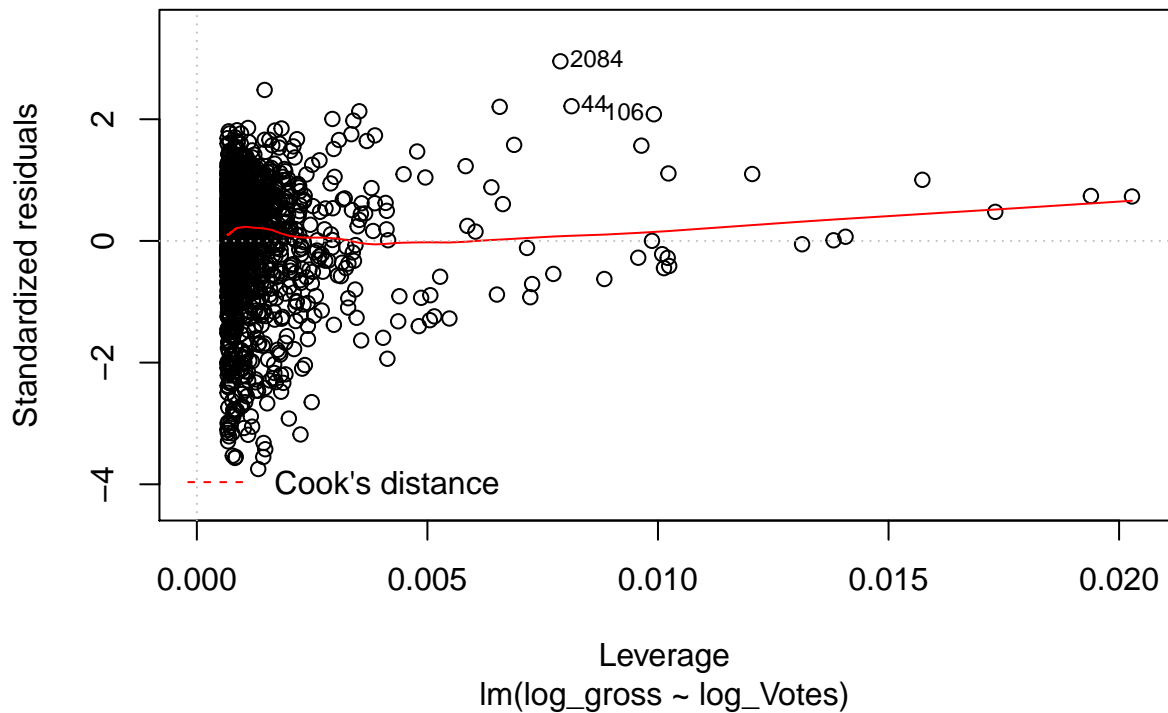
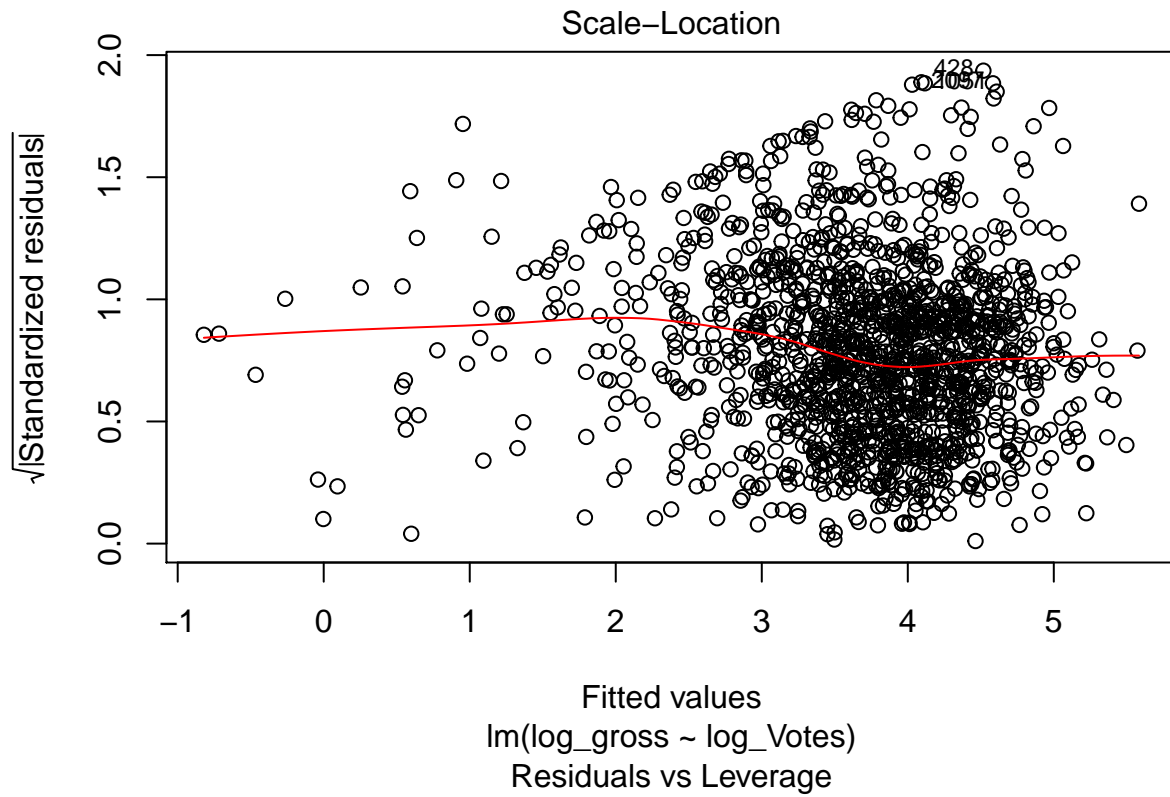
```
qqnorm(newmovie$log_gross)
```

Normal Q-Q Plot



```
#set training data set and testing data set  
set.seed(1)  
t = sample(1:2000, 2000)  
train = newmovie[t[1:1500],]  
test = newmovie[t[1501:2000],]  
newmovie<-train  
  
plot(lm(log_gross~log_Votes, data=newmovie))
```

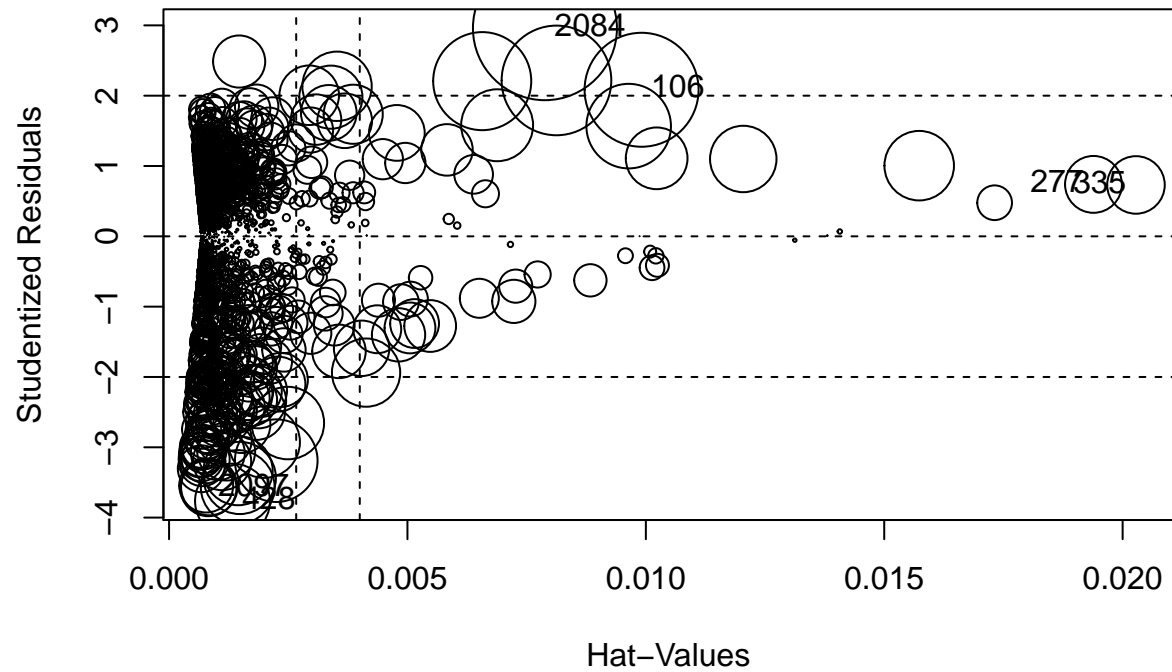




```
outlierTest(lm(log_gross ~ log_Votes, data=newmovie))
```

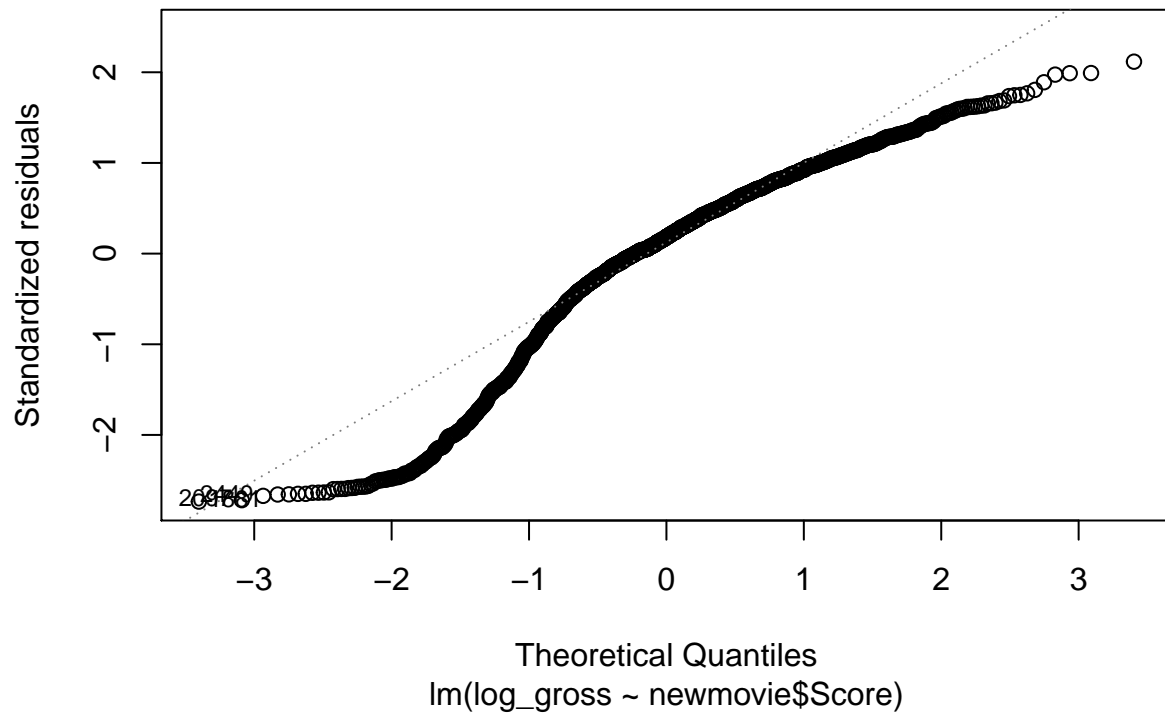
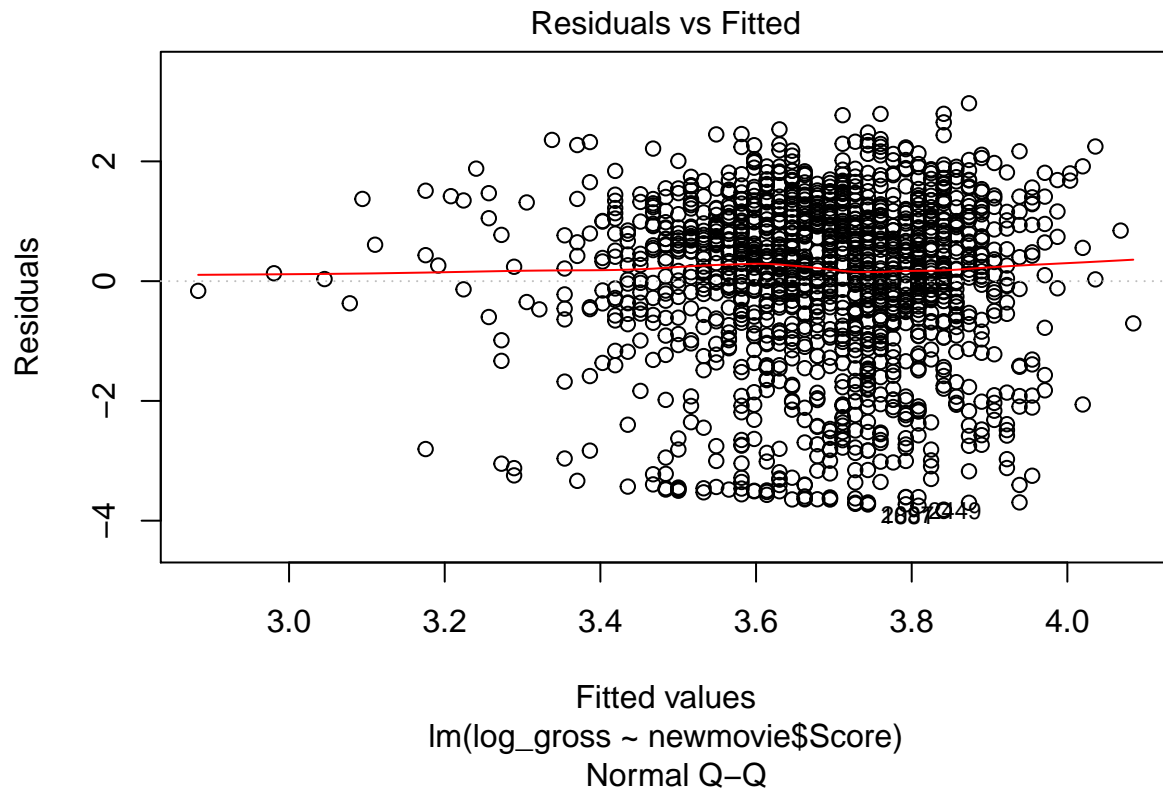
```
## No Studentized residuals with Bonferroni p < 0.05
## Largest |rstudent|:
##      rstudent unadjusted p-value Bonferroni p
## 428 -3.765322      0.00017277      0.25916
```

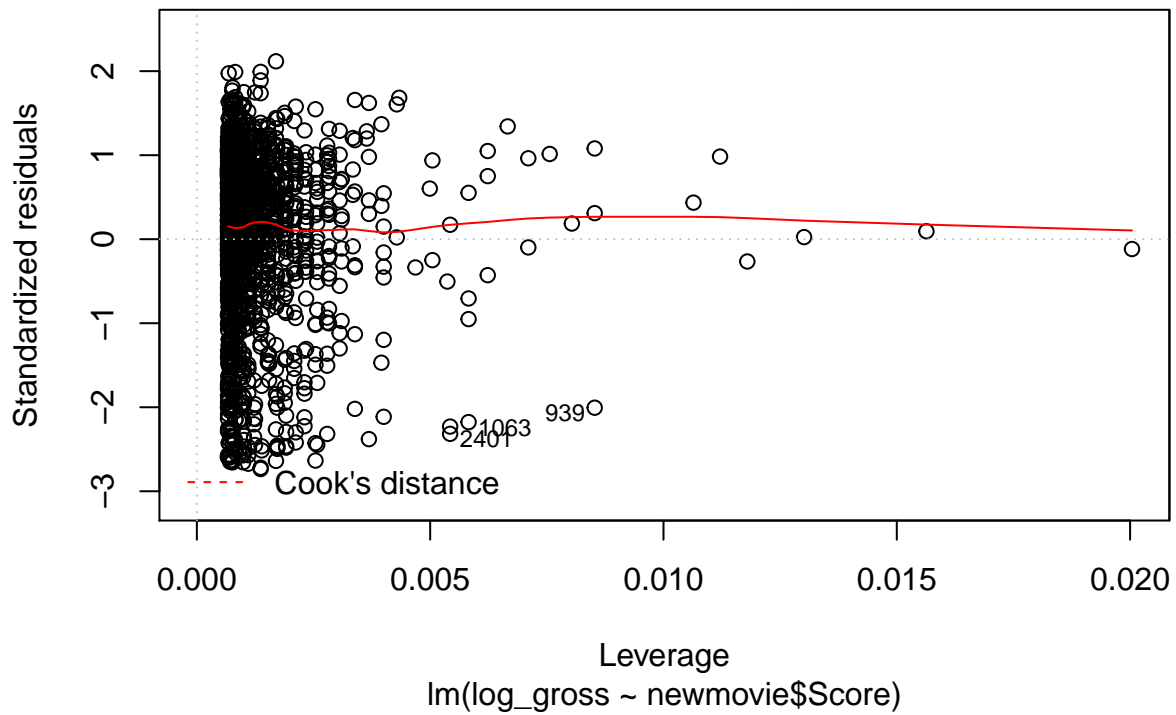
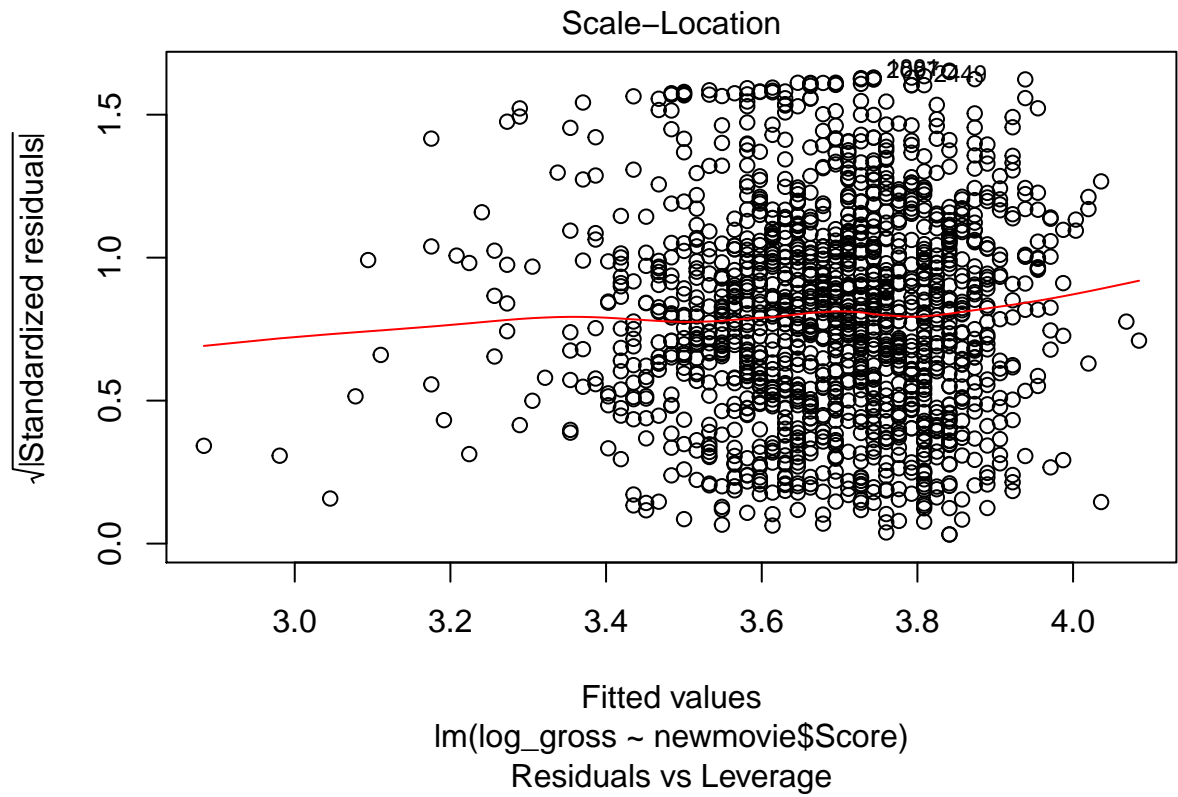
```
influencePlot(lm(log_gross~log_Votes, data=newmovie))
```



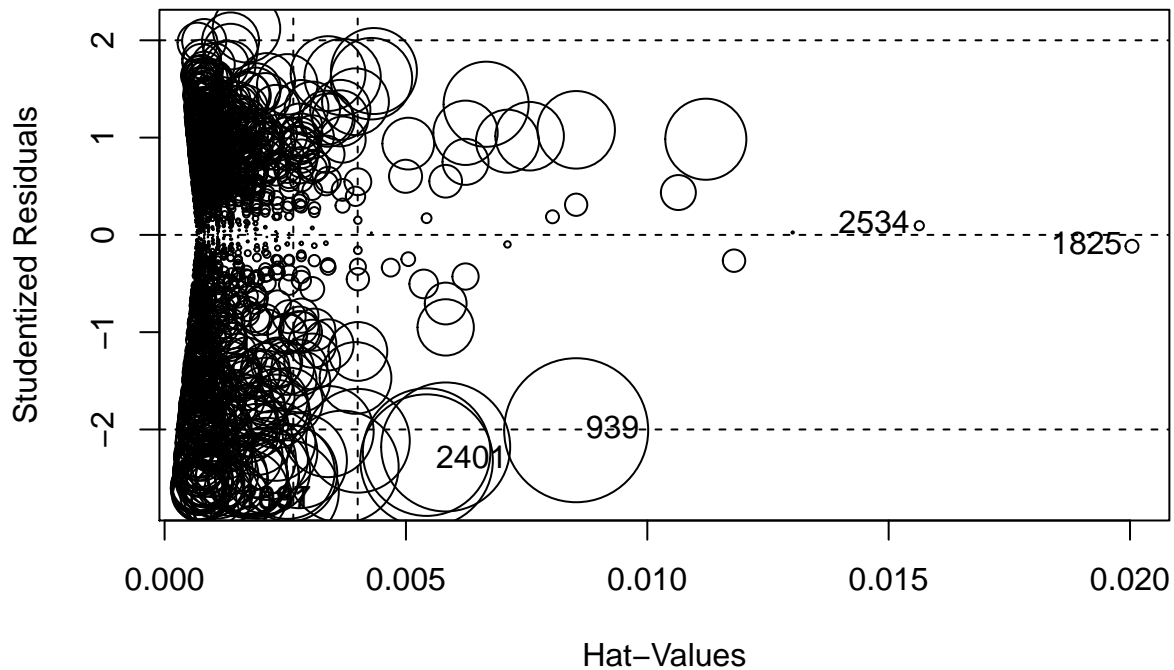
##	StudRes	Hat	CookD
## 2084	2.9596585	0.0078836306	0.034623665
## 428	-3.7653224	0.0013306570	0.009363001
## 106	2.0842290	0.0099107070	0.021693156
## 335	0.7307360	0.0202798691	0.005528270
## 2097	-3.5812276	0.0008251723	0.005254388
## 277	0.7387871	0.0193887270	0.005397501

```
plot(lm(log_gross~newmovie$Score, data=newmovie))
```





```
influencePlot(lm(log_gross~newmovie$Score, data=newmovie))
```

```
##          StudRes      Hat      CookD
## 2401 -2.31995851 0.005427649 1.464324e-02
## 2534  0.09445099 0.015634842 7.089372e-05
## 1881 -2.74107592 0.001366742 5.119274e-03
## 939  -2.00765505 0.008526048 1.729565e-02
## 2097 -2.72536194 0.001366742 5.061035e-03
## 1825 -0.11689879 0.020040569 1.398228e-04
```

```
outlierTest(lm(log_gross~newmovie$Score, data=newmovie))
```

```
## No Studentized residuals with Bonferroni p < 0.05
## Largest |rstudent|:
##      rstudent unadjusted p-value Bonferroni p
## 1881 -2.741076      0.0061967      NA
```

```
model<-lm(log_gross~new_Year+Level+final_Duration+Score+log_Votes+Action+Adventure+Animation+Biography+
```

```
summary(model)
```

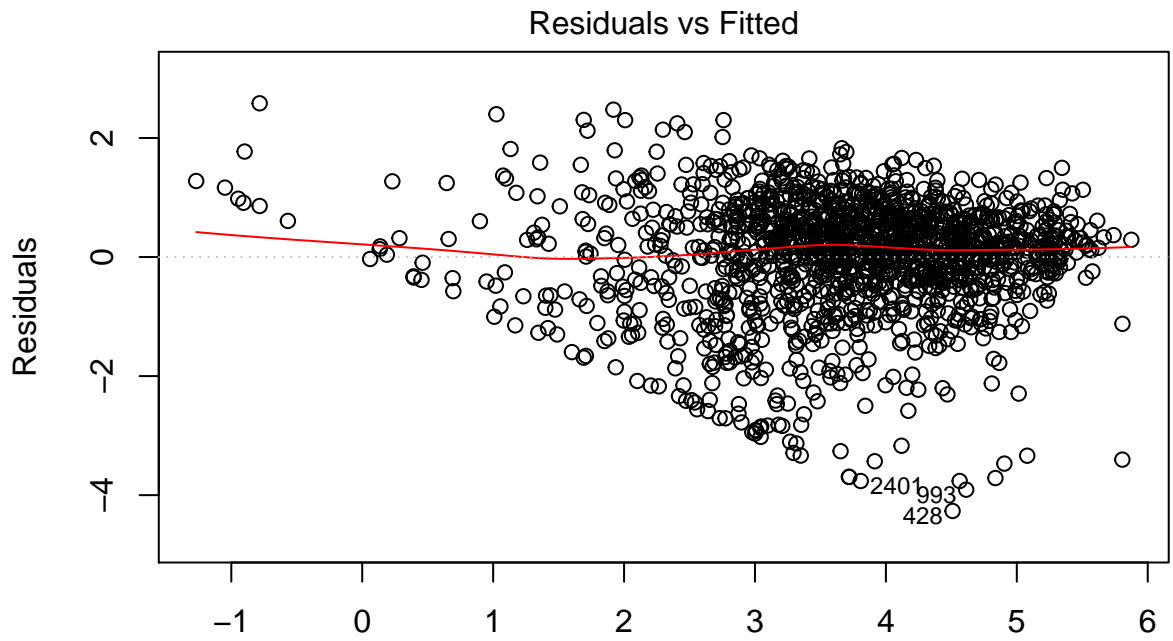
```
##
## Call:
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##      Score + log_Votes + Action + Adventure + Animation + Biography +
##      Comedy + Crime + Drama + Family + Fantasy + Film_Noir + History +
##      Horror + Music + Musical + Mystery + Romance + Sci_Fi + Sport +
##      Thriller + War + Western, data = newmovie)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.2658 -0.4320  0.1547  0.6100  2.5825
##
## Coefficients: (1 not defined because of singularities)
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -1.543029   0.341512  -4.518 6.73e-06 ***
```

```

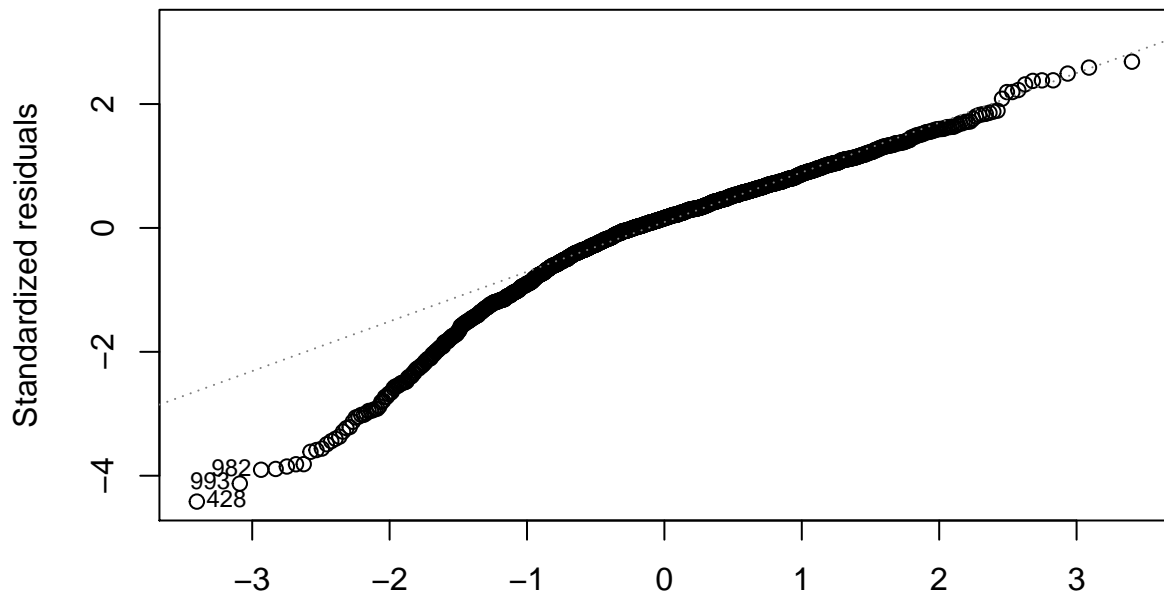
## new_Yearfirst_ten      -0.251952    0.071390   -3.529 0.000430 ***
## new_Yearsecond_ten     -0.153339    0.068487   -2.239 0.025308 *
## LevelPG-13             -0.056658    0.102867   -0.551 0.581860
## LevelR                 -0.736924    0.103865   -7.095 2.00e-12 ***
## final_DurationNormal   -0.374130    0.065011   -5.755 1.05e-08 ***
## final_DurationShort    -0.603960    0.081093   -7.448 1.61e-13 ***
## Score                  -0.297410    0.037887   -7.850 7.96e-15 ***
## log_Votes              0.695320    0.027012   25.741 < 2e-16 ***
## Action                 0.090774    0.078321    1.159 0.246647
## Adventure              0.050027    0.081049    0.617 0.537169
## Animation              0.607924    0.163811    3.711 0.000214 ***
## Biography              0.104021    0.112451    0.925 0.355104
## Comedy                 0.162097    0.078955    2.053 0.040246 *
## Crime                  -0.011185    0.080479   -0.139 0.889481
## Drama                  -0.330927    0.075684   -4.373 1.31e-05 ***
## Family                 0.303490    0.138756    2.187 0.028883 *
## Fantasy                -0.099611    0.091205   -1.092 0.274940
## Film_Noir              NA          NA          NA          NA
## History                0.240520    0.169634    1.418 0.156440
## Horror                 -0.020926    0.103240   -0.203 0.839405
## Music                  0.007861    0.161241    0.049 0.961122
## Musical                0.644114    0.266670    2.415 0.015839 *
## Mystery                -0.064341    0.093518   -0.688 0.491558
## Romance                0.100306    0.087194    1.150 0.250175
## Sci_Fi                 -0.130378    0.092690   -1.407 0.159754
## Sport                  0.357773    0.219731    1.628 0.103690
## Thriller               0.068123    0.082109    0.830 0.406863
## War                    0.200565    0.200067    1.002 0.316274
## Western                -0.571898    0.319506   -1.790 0.073669 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9746 on 1471 degrees of freedom
## Multiple R-squared:  0.5321, Adjusted R-squared:  0.5232
## F-statistic: 59.75 on 28 and 1471 DF, p-value: < 2.2e-16

```

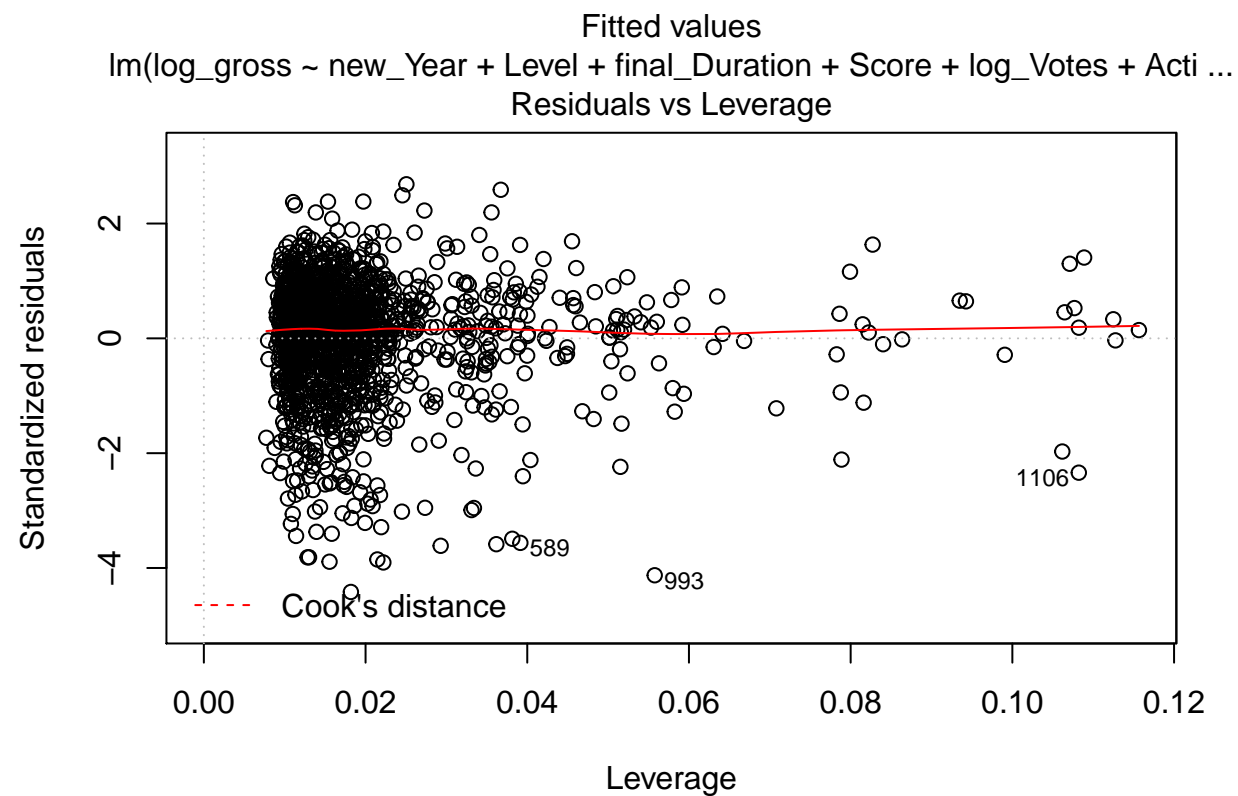
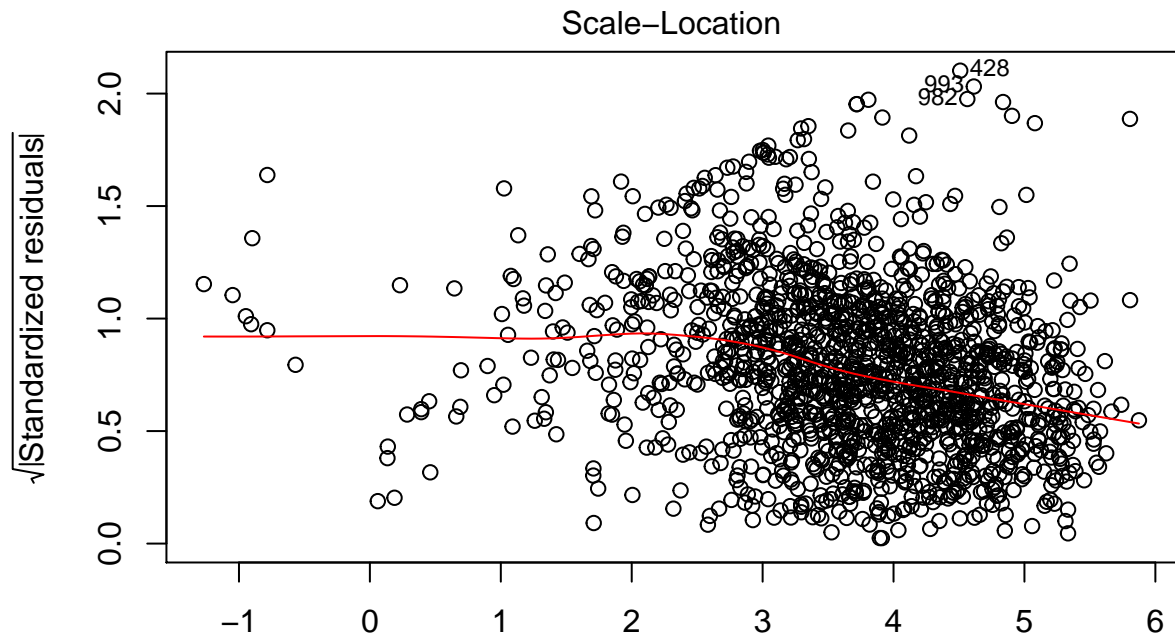
```
plot(model)
```



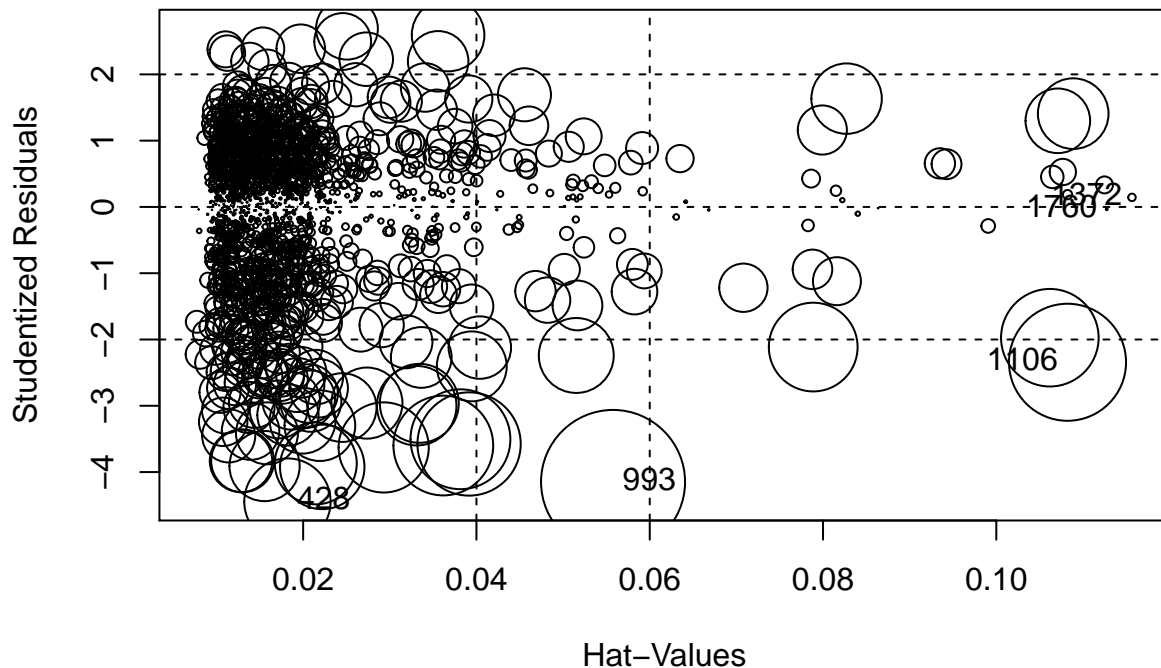
Im(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Acti ...
Normal Q-Q



Im(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Acti ...



```
influencePlot(model)
```



```
##           StudRes      Hat      CookD
## 1760 -0.03552558 0.11275059 5.534170e-06
## 993  -4.14910372 0.05576493 3.467612e-02
## 428  -4.44528258 0.01818740 1.246347e-02
## 1372 0.14409044 0.11565670 9.369393e-05
## 1106 -2.34344346 0.10821682 2.290986e-02
```

```
HighLeverage <- cooks.distance(model) > (4/nrow(newmovie))
LargeResiduals <- rstudent(model) > 3
datanml <- newmovie[!HighLeverage & !LargeResiduals,]
```

```
model2<-lm(log_gross~new_Year+Level+final_Duration+Score+log_Votes+Action+Adventure+Animation+Biography+
summary(model2)
```

```
##
## Call:
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##      Score + log_Votes + Action + Adventure + Animation + Biography +
##      Comedy + Crime + Drama + Family + Fantasy + Film_Noir + History +
##      Horror + Music + Musical + Mystery + Romance + Sci_Fi + Sport +
##      Thriller + War + Western, data = datanml)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.53505 -0.43178  0.06512  0.49395  2.23070
##
## Coefficients: (1 not defined because of singularities)
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -2.034658   0.286370  -7.105 1.92e-12 ***
## new_Yearfirst_ten -0.270500   0.058157  -4.651 3.61e-06 ***
## new_Yearsecond_ten -0.194002   0.055771  -3.479 0.00052 ***
## LevelPG-13     -0.140201   0.085208  -1.645 0.10011
## LevelR         -0.808453   0.086237  -9.375 < 2e-16 ***
```

```
## final_DurationNormal -0.311915 0.052585 -5.932 3.78e-09 ***
## final_DurationShort -0.427417 0.066866 -6.392 2.23e-10 ***
## Score -0.322256 0.032299 -9.977 < 2e-16 ***
## log_Votes 0.764268 0.022709 33.654 < 2e-16 ***
## Action 0.025992 0.063189 0.411 0.68088
## Adventure -0.009508 0.065552 -0.145 0.88469
## Animation 0.697507 0.140978 4.948 8.43e-07 ***
## Biography 0.158542 0.091492 1.733 0.08334 .
## Comedy 0.100445 0.064413 1.559 0.11913
## Crime 0.005457 0.065129 0.084 0.93324
## Drama -0.347176 0.061813 -5.617 2.35e-08 ***
## Family 0.277366 0.114611 2.420 0.01565 *
## Fantasy -0.051483 0.074382 -0.692 0.48896
## Film_Noir NA NA NA NA
## History 0.292305 0.139663 2.093 0.03654 *
## Horror -0.077481 0.084714 -0.915 0.36055
## Music -0.003838 0.143458 -0.027 0.97866
## Musical 0.578312 0.248471 2.327 0.02008 *
## Mystery 0.002012 0.077294 0.026 0.97924
## Romance 0.124680 0.071700 1.739 0.08227 .
## Sci_Fi -0.100141 0.075040 -1.335 0.18226
## Sport 0.409717 0.181620 2.256 0.02423 *
## Thriller 0.113881 0.066830 1.704 0.08860 .
## War 0.346910 0.171091 2.028 0.04279 *
## Western -0.323412 0.320597 -1.009 0.31326
```

```
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7683 on 1385 degrees of freedom
## Multiple R-squared: 0.6578, Adjusted R-squared: 0.6508
## F-statistic: 95.07 on 28 and 1385 DF, p-value: < 2.2e-16
```

```
maic<-stepAIC(model2)
```

```
## Start: AIC=-716.84
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Crime +
##   Drama + Family + Fantasy + Film_Noir + History + Horror +
##   Music + Musical + Mystery + Romance + Sci_Fi + Sport + Thriller +
##   War + Western
##
##
## Step: AIC=-716.84
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Crime +
##   Drama + Family + Fantasy + History + Horror + Music + Musical +
##   Mystery + Romance + Sci_Fi + Sport + Thriller + War + Western
##
##
```

	Df	Sum of Sq	RSS	AIC
## - Mystery	1	0.00	817.46	-718.84
## - Music	1	0.00	817.46	-718.84
## - Crime	1	0.00	817.46	-718.83
## - Adventure	1	0.01	817.47	-718.82
## - Action	1	0.10	817.56	-718.67
## - Fantasy	1	0.28	817.74	-718.35

```

## - Horror      1      0.49  817.95 -717.99
## - Western     1      0.60  818.06 -717.80
## - Sci_Fi      1      1.05  818.51 -717.02
## <none>                817.46 -716.84
## - Comedy     1      1.44  818.89 -716.36
## - Thriller    1      1.71  819.17 -715.88
## - Biography   1      1.77  819.23 -715.78
## - Romance     1      1.78  819.24 -715.76
## - War         1      2.43  819.89 -714.65
## - History     1      2.59  820.04 -714.37
## - Sport       1      3.00  820.46 -713.65
## - Musical     1      3.20  820.66 -713.32
## - Family      1      3.46  820.92 -712.87
## - new_Year    2     13.28  830.74 -698.05
## - Animation   1     14.45  831.91 -694.07
## - Drama       1     18.62  836.08 -686.99
## - final_Duration 2     28.18  845.64 -672.92
## - Score       1     58.75  876.21 -620.69
## - Level       2    116.09  933.55 -533.06
## - log_Votes   1    668.49 1485.95  126.18
##
## Step:  AIC=-718.84
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Action + Adventure + Animation + Biography + Comedy + Crime +
##      Drama + Family + Fantasy + History + Horror + Music + Musical +
##      Romance + Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Music      1      0.00  817.46 -720.84
## - Crime      1      0.00  817.46 -720.83
## - Adventure   1      0.01  817.47 -720.82
## - Action     1      0.10  817.56 -720.66
## - Fantasy     1      0.29  817.75 -720.33
## - Horror     1      0.49  817.95 -719.98
## - Western    1      0.61  818.06 -719.79
## - Sci_Fi     1      1.07  818.53 -718.98
## <none>                817.46 -718.84
## - Comedy     1      1.51  818.97 -718.22
## - Thriller    1      1.71  819.17 -717.88
## - Biography   1      1.81  819.27 -717.71
## - Romance     1      1.84  819.30 -717.66
## - War         1      2.43  819.89 -716.64
## - History     1      2.60  820.06 -716.35
## - Sport       1      3.03  820.48 -715.62
## - Musical     1      3.20  820.66 -715.31
## - Family      1      3.47  820.93 -714.84
## - new_Year    2     13.29  830.75 -700.04
## - Animation   1     14.48  831.94 -696.02
## - Drama       1     18.88  836.34 -688.55
## - final_Duration 2     28.21  845.67 -674.87
## - Score       1     58.98  876.44 -622.32
## - Level       2    116.10  933.56 -535.06
## - log_Votes   1    671.57 1489.03  127.11
##

```

```

## Step: AIC=-720.84
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Crime +
##   Drama + Family + Fantasy + History + Horror + Musical + Romance +
##   Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Crime      1      0.00  817.46 -722.83
## - Adventure   1      0.01  817.47 -722.82
## - Action      1      0.11  817.57 -722.66
## - Fantasy     1      0.29  817.75 -722.33
## - Horror      1      0.50  817.96 -721.98
## - Western     1      0.60  818.06 -721.79
## - Sci_Fi      1      1.08  818.54 -720.97
## <none>                817.46 -720.84
## - Comedy      1      1.54  819.00 -720.18
## - Thriller     1      1.76  819.22 -719.80
## - Biography    1      1.82  819.28 -719.69
## - Romance      1      1.87  819.33 -719.60
## - War          1      2.44  819.90 -718.62
## - History      1      2.62  820.08 -718.31
## - Sport        1      3.05  820.51 -717.56
## - Musical      1      3.21  820.67 -717.29
## - Family       1      3.50  820.96 -716.79
## - new_Year     2     13.33  830.79 -701.97
## - Animation    1     14.56  832.02 -697.88
## - Drama        1     18.94  836.40 -690.45
## - final_Duration 2     28.21  845.67 -676.87
## - Score        1     59.08  876.54 -624.16
## - Level        2    116.97  934.43 -535.74
## - log_Votes    1    676.93 1494.39  130.19
##
## Step: AIC=-722.83
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Drama +
##   Family + Fantasy + History + Horror + Musical + Romance +
##   Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Adventure    1      0.02  817.48 -724.80
## - Action       1      0.11  817.57 -724.65
## - Fantasy      1      0.32  817.78 -724.28
## - Horror       1      0.58  818.04 -723.83
## - Western      1      0.62  818.08 -723.76
## <none>                817.46 -722.83
## - Sci_Fi      1      1.20  818.66 -722.76
## - Comedy       1      1.56  819.02 -722.14
## - Thriller     1      1.77  819.23 -721.78
## - Biography    1      1.82  819.28 -721.69
## - Romance      1      2.03  819.49 -721.32
## - War          1      2.47  819.93 -720.56
## - History      1      2.65  820.12 -720.25
## - Sport        1      3.08  820.54 -719.52
## - Musical      1      3.21  820.67 -719.29

```



```

## - Family          1      3.50  820.96 -718.79
## - new_Year        2     13.33  830.79 -703.96
## - Animation        1     14.56  832.02 -699.88
## - Drama           1     19.17  836.64 -692.05
## - final_Duration  2     28.30  845.77 -678.70
## - Score            1     59.25  876.72 -625.88
## - Level            2    119.62  937.08 -533.73
## - log_Votes        1    677.77 1495.24  128.99
##
## Step:  AIC=-724.8
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Animation + Biography + Comedy + Drama + Family +
##   Fantasy + History + Horror + Musical + Romance + Sci_Fi +
##   Sport + Thriller + War + Western
##
##              Df Sum of Sq    RSS    AIC
## - Action          1      0.10  817.58 -726.63
## - Fantasy          1      0.31  817.80 -726.26
## - Horror           1      0.56  818.04 -725.83
## - Western          1      0.61  818.09 -725.74
## <none>              817.48 -724.80
## - Sci_Fi          1      1.19  818.67 -724.75
## - Comedy           1      1.71  819.20 -723.84
## - Biography        1      1.88  819.36 -723.55
## - Thriller         1      1.97  819.46 -723.39
## - Romance          1      2.18  819.66 -723.04
## - War              1      2.49  819.98 -722.49
## - History          1      2.69  820.17 -722.16
## - Sport            1      3.18  820.67 -721.30
## - Musical          1      3.27  820.75 -721.16
## - Family           1      3.49  820.97 -720.77
## - new_Year         2     13.32  830.80 -705.95
## - Animation        1     14.64  832.13 -701.69
## - Drama            1     20.27  837.75 -692.17
## - final_Duration  2     28.42  845.91 -680.47
## - Score            1     59.68  877.17 -627.16
## - Level            2    127.77  945.26 -523.45
## - log_Votes        1    683.00 1500.48  131.94
##
## Step:  AIC=-726.63
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Biography + Comedy + Drama + Family + Fantasy +
##   History + Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##   War + Western
##
##              Df Sum of Sq    RSS    AIC
## - Fantasy          1      0.35  817.93 -728.02
## - Western          1      0.64  818.22 -727.52
## - Horror           1      0.81  818.39 -727.23
## <none>              817.58 -726.63
## - Sci_Fi          1      1.19  818.77 -726.57
## - Comedy           1      1.66  819.24 -725.76
## - Biography        1      1.79  819.37 -725.53
## - Thriller         1      1.88  819.46 -725.39

```

```

## - Romance          1      2.08  819.66 -725.03
## - War              1      2.46  820.04 -724.37
## - History          1      2.64  820.22 -724.06
## - Sport            1      3.10  820.68 -723.28
## - Musical          1      3.20  820.78 -723.11
## - Family           1      3.41  820.99 -722.75
## - new_Year         2     13.27  830.85 -707.86
## - Animation        1     14.58  832.16 -703.64
## - Drama            1     26.27  843.85 -683.92
## - final_Duration   2     28.92  846.49 -681.49
## - Score            1     61.93  879.51 -625.39
## - Level            2    129.93  947.51 -522.08
## - log_Votes        1    695.55 1513.13  141.81
##
## Step:  AIC=-728.02
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##      War + Western
##
##              Df Sum of Sq      RSS      AIC
## - Western      1      0.60  818.54 -728.97
## - Horror        1      0.79  818.72 -728.66
## - Sci_Fi        1      0.93  818.87 -728.41
## <none>                      817.93 -728.02
## - Biography     1      1.98  819.91 -726.60
## - Comedy         1      2.07  820.01 -726.43
## - Romance        1      2.24  820.17 -726.15
## - Thriller       1      2.47  820.40 -725.76
## - War            1      2.48  820.41 -725.74
## - History        1      2.75  820.69 -725.27
## - Musical        1      3.28  821.21 -724.36
## - Family         1      3.30  821.23 -724.32
## - Sport          1      3.30  821.23 -724.32
## - new_Year       2     13.43  831.37 -708.98
## - Animation      1     15.36  833.29 -703.71
## - Drama          1     25.94  843.88 -685.87
## - final_Duration 2     28.72  846.66 -683.22
## - Score          1     61.60  879.54 -627.34
## - Level          2    130.90  948.83 -522.11
## - log_Votes      1    698.51 1516.45  142.91
##
## Step:  AIC=-728.97
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##      War
##
##              Df Sum of Sq      RSS      AIC
## - Horror        1      0.76  819.30 -729.65
## - Sci_Fi        1      0.87  819.41 -729.47
## <none>                      818.54 -728.97
## - Biography     1      2.05  820.59 -727.43
## - Comedy         1      2.15  820.68 -727.27

```

```

## - Romance      1      2.32  820.86 -726.97
## - War          1      2.52  821.05 -726.64
## - Thriller     1      2.64  821.17 -726.43
## - History      1      2.77  821.31 -726.20
## - Musical      1      3.30  821.83 -725.29
## - Sport        1      3.34  821.87 -725.22
## - Family       1      3.42  821.96 -725.08
## - new_Year     2     13.43  831.97 -709.96
## - Animation    1     15.59  834.13 -704.30
## - Drama        1     25.49  844.03 -687.61
## - final_Duration 2     28.56  847.10 -684.47
## - Score        1     62.16  880.70 -627.48
## - Level        2    131.26  949.79 -522.68
## - log_Votes    1    706.29 1524.82  148.70
##
## Step:  AIC=-729.65
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Musical + Romance + Sci_Fi + Sport + Thriller + War
##
##           Df Sum of Sq      RSS      AIC
## - Sci_Fi      1      0.80  820.10 -730.27
## <none>                819.30 -729.65
## - Biography    1      2.20  821.50 -727.87
## - Romance      1      2.57  821.88 -727.22
## - War          1      2.68  821.99 -727.03
## - Thriller     1      2.75  822.05 -726.92
## - History      1      2.80  822.10 -726.83
## - Comedy       1      2.96  822.26 -726.56
## - Musical      1      3.21  822.52 -726.12
## - Sport        1      3.46  822.76 -725.69
## - Family       1      3.62  822.92 -725.42
## - new_Year     2     13.33  832.63 -710.84
## - Animation    1     16.09  835.39 -704.16
## - Drama        1     24.73  844.04 -689.60
## - final_Duration 2     31.32  850.62 -680.61
## - Score        1     61.65  880.95 -629.07
## - Level        2    143.06  962.36 -506.09
## - log_Votes    1    707.45 1526.75  148.48
##
## Step:  AIC=-730.27
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Musical + Romance + Sport + Thriller + War
##
##           Df Sum of Sq      RSS      AIC
## <none>                820.10 -730.27
## - Biography    1      2.45  822.55 -728.06
## - War          1      2.82  822.92 -727.42
## - Romance      1      2.86  822.96 -727.36
## - History      1      2.94  823.05 -727.21
## - Thriller     1      3.35  823.46 -726.50
## - Musical      1      3.36  823.47 -726.49
## - Sport        1      3.67  823.78 -725.96

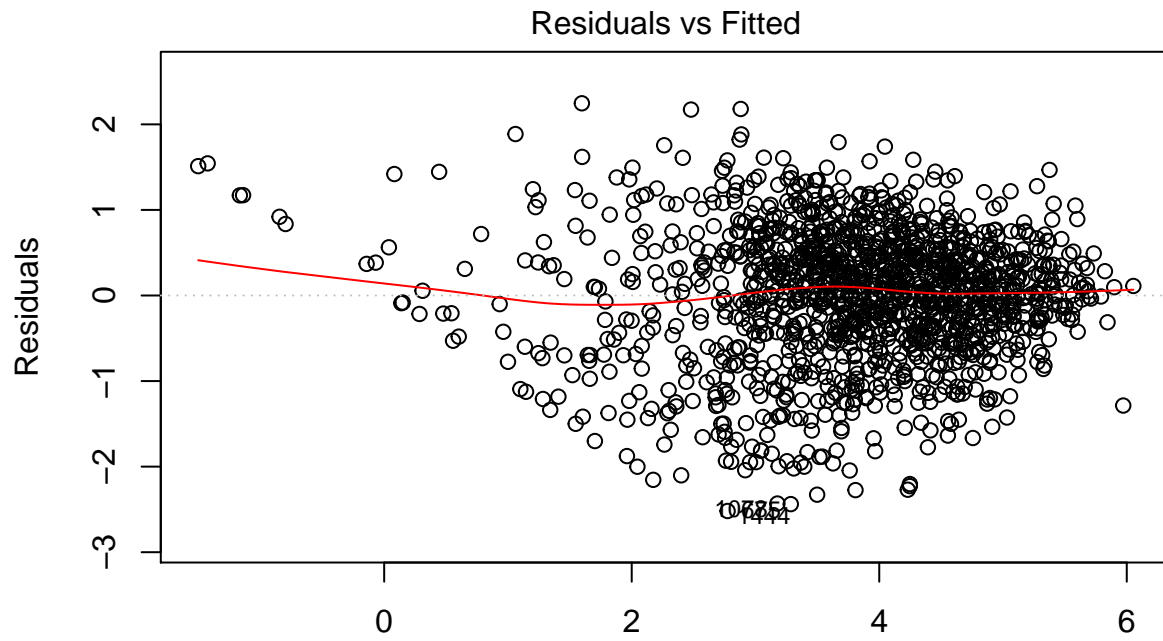
```

```
## - Comedy      1      3.92  824.02 -725.54
## - Family      1      4.04  824.14 -725.33
## - new_Year    2     13.29  833.39 -711.54
## - Animation   1     16.81  836.91 -703.58
## - Drama       1     23.93  844.04 -691.60
## - final_Duration 2     31.27  851.37 -681.36
## - Score       1     61.34  881.45 -630.28
## - Level       2    142.29  962.39 -508.05
## - log_Votes   1    710.29 1530.39  149.85
```

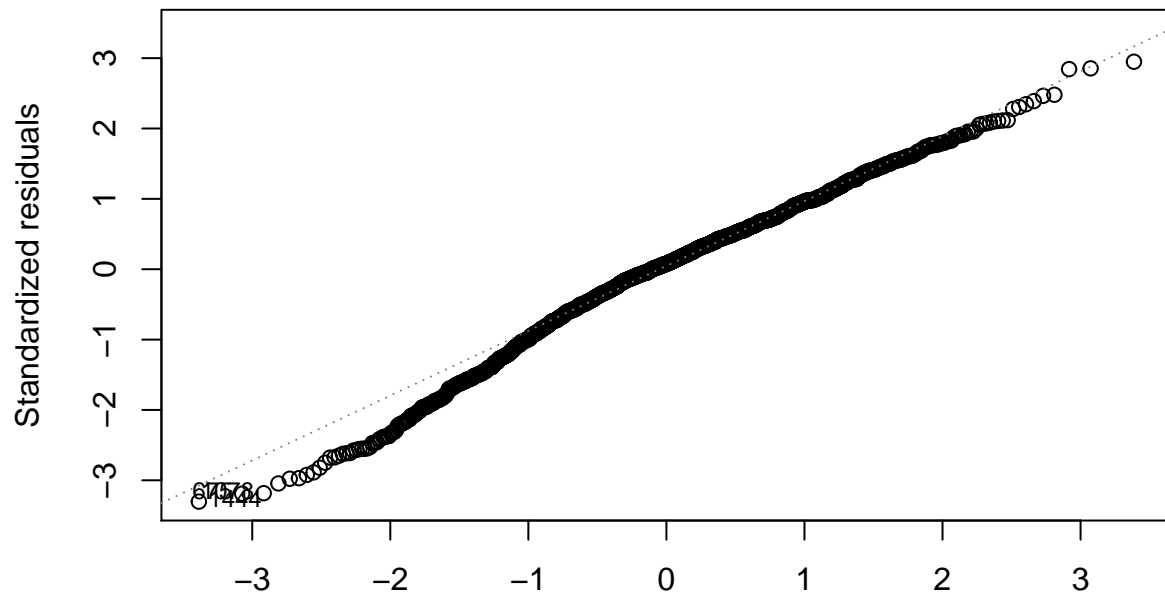
```
summary(maic)
```

```
##
## Call:
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##      Score + log_Votes + Animation + Biography + Comedy + Drama +
##      Family + History + Musical + Romance + Sport + Thriller +
##      War, data = datanml)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.51841 -0.43725  0.05692  0.50819  2.24596
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -2.08430    0.26633  -7.826 9.88e-15 ***
## new_Yearfirst_ten -0.26923    0.05790  -4.650 3.63e-06 ***
## new_Yearsecond_ten -0.19556    0.05537  -3.532 0.000426 ***
## LevelPG-13     -0.14035    0.08439  -1.663 0.096511 .
## LevelR         -0.81000    0.08147  -9.942 < 2e-16 ***
## final_DurationNormal -0.31793    0.05170  -6.150 1.01e-09 ***
## final_DurationShort -0.43973    0.06476  -6.790 1.65e-11 ***
## Score          -0.32010    0.03135 -10.211 < 2e-16 ***
## log_Votes       0.76317    0.02196  34.747 < 2e-16 ***
## Animation       0.72801    0.13619   5.345 1.05e-07 ***
## Biography       0.17829    0.08740   2.040 0.041537 *
## Comedy          0.13116    0.05084   2.580 0.009983 **
## Drama          -0.32291    0.05063  -6.378 2.43e-10 ***
## Family          0.28704    0.10957   2.620 0.008898 **
## History         0.30424    0.13606   2.236 0.025498 *
## Musical         0.58669    0.24538   2.391 0.016938 *
## Romance         0.13697    0.06216   2.204 0.027710 *
## Sport          0.43648    0.17471   2.498 0.012595 *
## Thriller        0.14147    0.05926   2.387 0.017106 *
## War             0.36685    0.16754   2.190 0.028719 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.767 on 1394 degrees of freedom
## Multiple R-squared:  0.6567, Adjusted R-squared:  0.652
## F-statistic: 140.3 on 19 and 1394 DF, p-value: < 2.2e-16
```

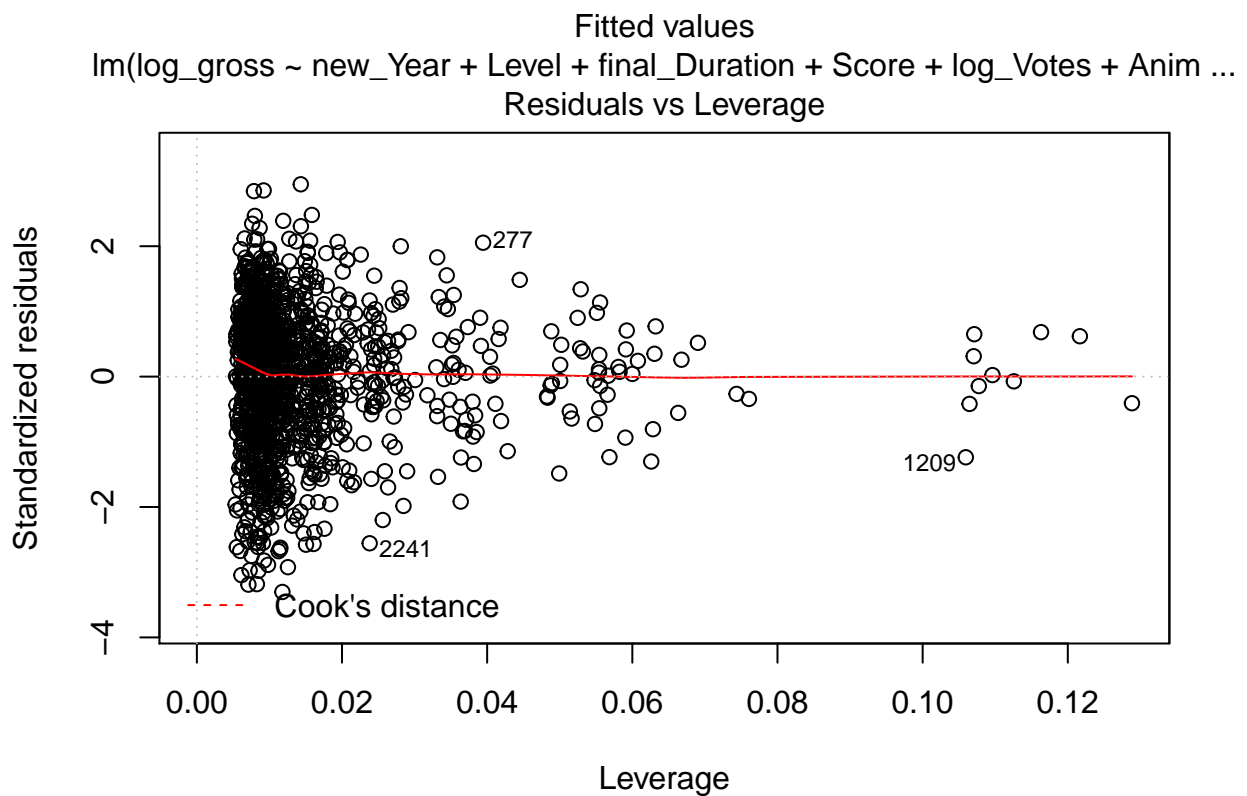
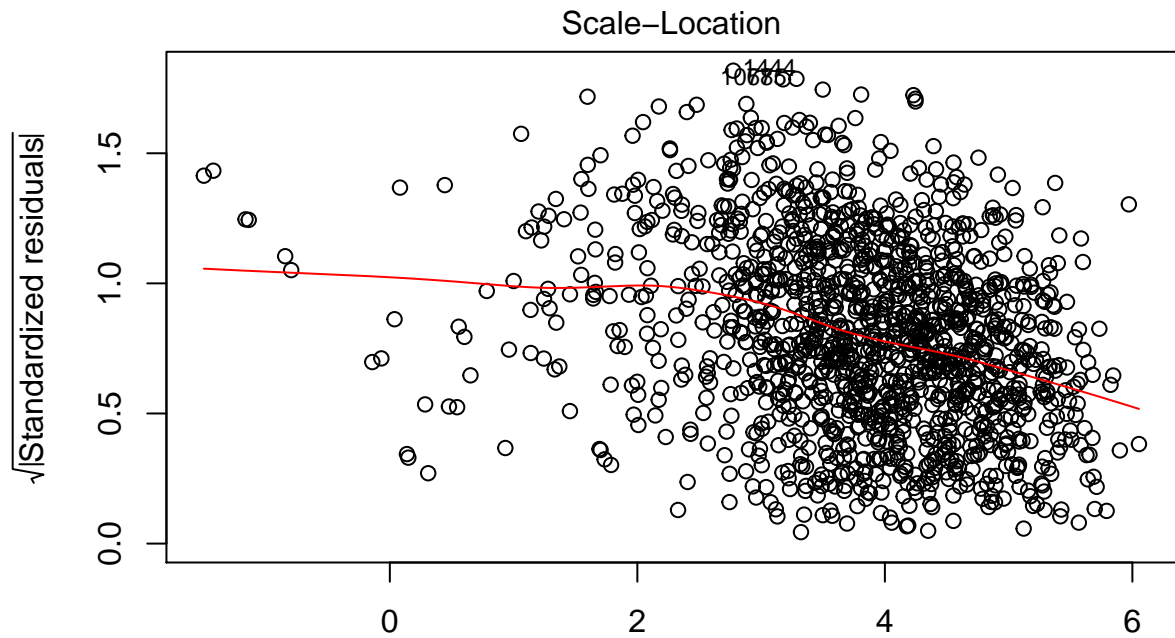
```
plot(maic)
```



lm(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Anim ...
Normal Q-Q

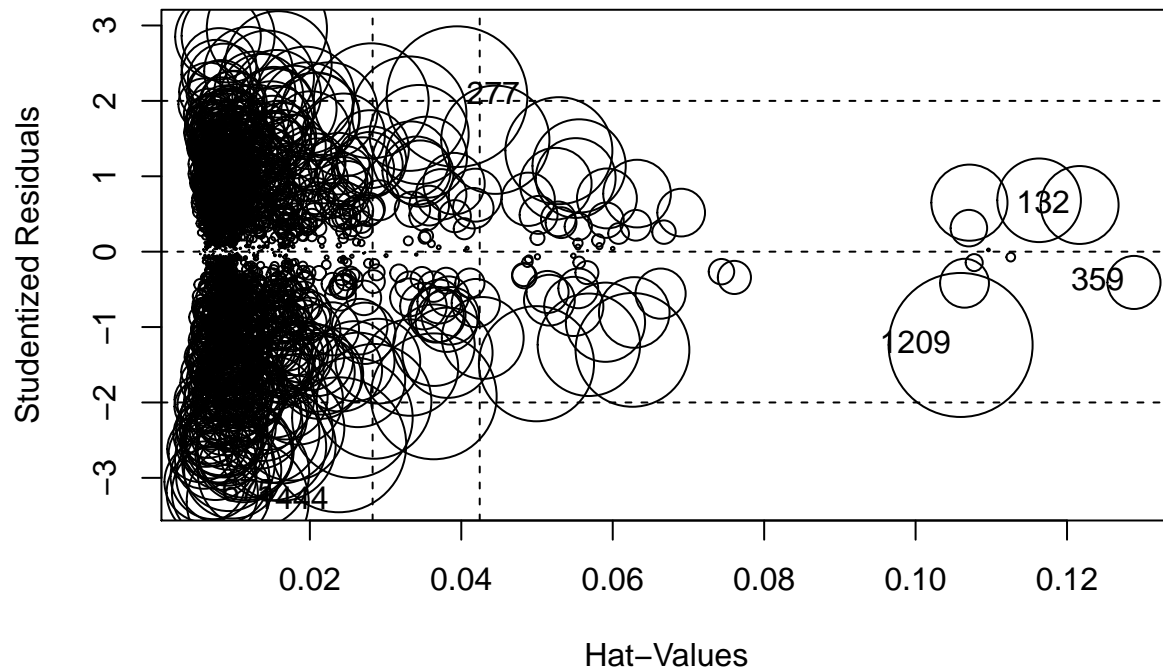


lm(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Anim ...



lm(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Anim ...)

```
influencePlot(maic)
```



```
##           StudRes      Hat      CookD
## 1209 -1.2376691 0.105945385 0.009072594
## 132  0.6191466 0.121663293 0.002656120
## 675  -3.2007276 0.007107491 0.003642595
## 1444 -3.3147393 0.011789748 0.006507639
## 359  -0.4082910 0.128841633 0.001233469
## 277  2.0559862 0.039434581 0.008656782
```

```
vif(maic)
```

```
##           GVIF Df GVIF^(1/(2*Df))
## new_Year      1.359297 2      1.079763
## Level         2.262654 2      1.226463
## final_Duration 1.447767 2      1.096919
## Score         1.845277 1      1.358410
## log_Votes     1.763484 1      1.327963
## Animation     1.403138 1      1.184541
## Biography     1.206508 1      1.098412
## Comedy        1.382842 1      1.175943
## Drama         1.537781 1      1.240073
## Family        1.558399 1      1.248359
## History       1.103901 1      1.050667
## Musical       1.016249 1      1.008092
## Romance       1.210887 1      1.100403
## Sport         1.023048 1      1.011458
## Thriller      1.224619 1      1.106625
## War           1.033386 1      1.016556
```

```
#cross validation
```

```
mfinal<-lm(formula = log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Animation + Cor
summary(mfinal)
```

```
##
## Call:
```

```
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##      Score + log_Votes + Animation + Comedy + Drama + Family +
##      Fantasy + History + Musical + Sci_Fi + Sport + War, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.3468 -0.5126  0.0949  0.5809  2.2498
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -0.84689    0.48673  -1.740  0.08250 .
## new_Yearfirst_ten -0.15984    0.11742  -1.361  0.17405
## new_Yearsecond_ten  0.15086    0.10663   1.415  0.15776
## LevelPG-13     -0.35640    0.17062  -2.089  0.03724 *
## LevelR         -0.96601    0.16574  -5.828 1.03e-08 ***
## final_DurationNormal -0.54743    0.10177  -5.379 1.17e-07 ***
## final_DurationShort -0.66770    0.12690  -5.262 2.15e-07 ***
## Score          -0.33003    0.05813  -5.677 2.37e-08 ***
## log_Votes       0.68171    0.04260  16.003 < 2e-16 ***
## Animation       0.27966    0.26362   1.061  0.28929
## Comedy         0.15717    0.10198   1.541  0.12392
## Drama          -0.30751    0.10073  -3.053  0.00239 **
## Family         0.44956    0.23177   1.940  0.05300 .
## Fantasy        -0.32280    0.14800  -2.181  0.02967 *
## History        -0.28298    0.22847  -1.239  0.21611
## Musical        0.38388    0.46217   0.831  0.40661
## Sci_Fi         -0.12445    0.13194  -0.943  0.34604
## Sport          0.09063    0.25277   0.359  0.72010
## War           0.15198    0.35802   0.424  0.67139
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9045 on 481 degrees of freedom
## Multiple R-squared:  0.5717, Adjusted R-squared:  0.5557
## F-statistic: 35.67 on 18 and 481 DF,  p-value: < 2.2e-16
mbic<-stepAIC(model2, k = log(length(model2$residuals)))

## Start:  AIC=-564.47
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Action + Adventure + Animation + Biography + Comedy + Crime +
##      Drama + Family + Fantasy + Film_Noir + History + Horror +
##      Music + Musical + Mystery + Romance + Sci_Fi + Sport + Thriller +
##      War + Western
##
##
## Step:  AIC=-564.47
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Action + Adventure + Animation + Biography + Comedy + Crime +
##      Drama + Family + Fantasy + History + Horror + Music + Musical +
##      Mystery + Romance + Sci_Fi + Sport + Thriller + War + Western
##
##
```

	Df	Sum of Sq	RSS	AIC
- Mystery	1	0.00	817.46	-571.72
- Music	1	0.00	817.46	-571.72


```

## - Crime          1      0.00  817.46 -571.72
## - Adventure      1      0.01  817.47 -571.70
## - Action         1      0.10  817.56 -571.55
## - Fantasy        1      0.28  817.74 -571.23
## - Horror         1      0.49  817.95 -570.87
## - Western        1      0.60  818.06 -570.68
## - Sci_Fi         1      1.05  818.51 -569.91
## - Comedy         1      1.44  818.89 -569.24
## - Thriller       1      1.71  819.17 -568.76
## - Biography      1      1.77  819.23 -568.66
## - Romance        1      1.78  819.24 -568.64
## - War            1      2.43  819.89 -567.53
## - History        1      2.59  820.04 -567.26
## - Sport          1      3.00  820.46 -566.54
## - Musical        1      3.20  820.66 -566.20
## - Family         1      3.46  820.92 -565.76
## <none>           817.46 -564.47
## - new_Year       2     13.28  830.74 -556.18
## - Animation      1     14.45  831.91 -546.95
## - Drama          1     18.62  836.08 -539.88
## - final_Duration 2     28.18  845.64 -531.06
## - Score          1     58.75  876.21 -473.58
## - Level          2    116.09  933.55 -391.20
## - log_Votes      1    668.49 1485.95  273.29
##
## Step:  AIC=-571.72
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Action + Adventure + Animation + Biography + Comedy + Crime +
##      Drama + Family + Fantasy + History + Horror + Music + Musical +
##      Romance + Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Music          1      0.00  817.46 -578.97
## - Crime          1      0.00  817.46 -578.97
## - Adventure      1      0.01  817.47 -578.95
## - Action         1      0.10  817.56 -578.80
## - Fantasy        1      0.29  817.75 -578.47
## - Horror         1      0.49  817.95 -578.12
## - Western        1      0.61  818.06 -577.93
## - Sci_Fi         1      1.07  818.53 -577.12
## - Comedy         1      1.51  818.97 -576.36
## - Thriller       1      1.71  819.17 -576.01
## - Biography      1      1.81  819.27 -575.84
## - Romance        1      1.84  819.30 -575.79
## - War            1      2.43  819.89 -574.78
## - History        1      2.60  820.06 -574.48
## - Sport          1      3.03  820.48 -573.75
## - Musical        1      3.20  820.66 -573.45
## - Family         1      3.47  820.93 -572.98
## <none>           817.46 -571.72
## - new_Year       2     13.29  830.75 -563.43
## - Animation      1     14.48  831.94 -554.16
## - Drama          1     18.88  836.34 -546.68
## - final_Duration 2     28.21  845.67 -538.26

```

```

## - Score          1      58.98  876.44 -480.46
## - Level          2     116.10  933.56 -398.45
## - log_Votes      1     671.57 1489.03  268.97
##
## Step:  AIC=-578.97
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Crime +
##   Drama + Family + Fantasy + History + Horror + Musical + Romance +
##   Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Crime          1      0.00  817.46 -586.22
## - Adventure       1      0.01  817.47 -586.21
## - Action          1      0.11  817.57 -586.05
## - Fantasy         1      0.29  817.75 -585.72
## - Horror          1      0.50  817.96 -585.37
## - Western         1      0.60  818.06 -585.18
## - Sci_Fi          1      1.08  818.54 -584.37
## - Comedy          1      1.54  819.00 -583.57
## - Thriller        1      1.76  819.22 -583.20
## - Biography       1      1.82  819.28 -583.09
## - Romance         1      1.87  819.33 -582.99
## - War             1      2.44  819.90 -582.01
## - History         1      2.62  820.08 -581.70
## - Sport           1      3.05  820.51 -580.96
## - Musical         1      3.21  820.67 -580.68
## - Family          1      3.50  820.96 -580.18
## <none>                        817.46 -578.97
## - new_Year        2     13.33  830.79 -570.62
## - Animation       1     14.56  832.02 -561.27
## - Drama           1     18.94  836.40 -553.84
## - final_Duration  2     28.21  845.67 -545.51
## - Score           1     59.08  876.54 -487.55
## - Level           2    116.97  934.43 -404.39
## - log_Votes       1    676.93 1494.39  266.80
##
## Step:  AIC=-586.22
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Adventure + Animation + Biography + Comedy + Drama +
##   Family + Fantasy + History + Horror + Musical + Romance +
##   Sci_Fi + Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Adventure       1      0.02  817.48 -593.44
## - Action          1      0.11  817.57 -593.29
## - Fantasy         1      0.32  817.78 -592.92
## - Horror          1      0.58  818.04 -592.48
## - Western         1      0.62  818.08 -592.41
## - Sci_Fi          1      1.20  818.66 -591.41
## - Comedy          1      1.56  819.02 -590.79
## - Thriller        1      1.77  819.23 -590.42
## - Biography       1      1.82  819.28 -590.34
## - Romance         1      2.03  819.49 -589.97
## - War             1      2.47  819.93 -589.21

```

```

## - History      1      2.65  820.12 -588.89
## - Sport        1      3.08  820.54 -588.17
## - Musical      1      3.21  820.67 -587.94
## - Family       1      3.50  820.96 -587.43
## <none>         1      817.46 -586.22
## - new_Year     2     13.33  830.79 -577.86
## - Animation    1     14.56  832.02 -568.52
## - Drama        1     19.17  836.64 -560.70
## - final_Duration 2     28.30  845.77 -552.60
## - Score        1     59.25  876.72 -494.53
## - Level        2    119.62  937.08 -407.63
## - log_Votes    1    677.77 1495.24  260.34
##
## Step:  AIC=-593.44
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Action + Animation + Biography + Comedy + Drama + Family +
##   Fantasy + History + Horror + Musical + Romance + Sci_Fi +
##   Sport + Thriller + War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Action      1      0.10  817.58 -600.53
## - Fantasy      1      0.31  817.80 -600.16
## - Horror       1      0.56  818.04 -599.73
## - Western      1      0.61  818.09 -599.64
## - Sci_Fi       1      1.19  818.67 -598.65
## - Comedy       1      1.71  819.20 -597.74
## - Biography    1      1.88  819.36 -597.45
## - Thriller     1      1.97  819.46 -597.29
## - Romance      1      2.18  819.66 -596.94
## - War          1      2.49  819.98 -596.39
## - History      1      2.69  820.17 -596.06
## - Sport        1      3.18  820.67 -595.20
## - Musical      1      3.27  820.75 -595.06
## - Family       1      3.49  820.97 -594.67
## <none>         1      817.48 -593.44
## - new_Year     2     13.32  830.80 -585.10
## - Animation    1     14.64  832.13 -575.59
## - Drama        1     20.27  837.75 -566.07
## - final_Duration 2     28.42  845.91 -559.62
## - Score        1     59.68  877.17 -501.06
## - Level        2    127.77  945.26 -402.60
## - log_Votes    1    683.00 1500.48  258.04
##
## Step:  AIC=-600.53
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Biography + Comedy + Drama + Family + Fantasy +
##   History + Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##   War + Western
##
##           Df Sum of Sq    RSS    AIC
## - Fantasy      1      0.35  817.93 -607.17
## - Western      1      0.64  818.22 -606.67
## - Horror       1      0.81  818.39 -606.38
## - Sci_Fi       1      1.19  818.77 -605.72

```

```

## - Comedy          1          1.66  819.24 -604.91
## - Biography        1          1.79  819.37 -604.68
## - Thriller         1          1.88  819.46 -604.54
## - Romance          1          2.08  819.66 -604.19
## - War              1          2.46  820.04 -603.53
## - History          1          2.64  820.22 -603.22
## - Sport            1          3.10  820.68 -602.44
## - Musical          1          3.20  820.78 -602.26
## - Family           1          3.41  820.99 -601.91
## <none>              1          817.58 -600.53
## - new_Year         2         13.27  830.85 -592.27
## - Animation        1         14.58  832.16 -582.80
## - final_Duration   2         28.92  846.49 -565.89
## - Drama            1         26.27  843.85 -563.07
## - Score            1         61.93  879.51 -504.55
## - Level            2        129.93  947.51 -406.49
## - log_Votes        1        695.55 1513.13  262.66
##
## Step:  AIC=-607.17
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Biography + Comedy + Drama + Family + History +
##   Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##   War + Western
##
##              Df Sum of Sq    RSS    AIC
## - Western      1      0.60  818.54 -613.38
## - Horror        1      0.79  818.72 -613.07
## - Sci_Fi        1      0.93  818.87 -612.81
## - Biography     1      1.98  819.91 -611.01
## - Comedy        1      2.07  820.01 -610.84
## - Romance       1      2.24  820.17 -610.56
## - Thriller      1      2.47  820.40 -610.16
## - War           1      2.48  820.41 -610.15
## - History       1      2.75  820.69 -609.68
## - Musical       1      3.28  821.21 -608.77
## - Family        1      3.30  821.23 -608.73
## - Sport         1      3.30  821.23 -608.73
## <none>           1      817.93 -607.17
## - new_Year      2     13.43  831.37 -598.65
## - Animation     1     15.36  833.29 -588.12
## - final_Duration 2     28.72  846.66 -572.88
## - Drama         1     25.94  843.88 -570.27
## - Score         1     61.60  879.54 -511.75
## - Level         2    130.90  948.83 -411.77
## - log_Votes     1    698.51 1516.45  258.50
##
## Step:  AIC=-613.38
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Biography + Comedy + Drama + Family + History +
##   Horror + Musical + Romance + Sci_Fi + Sport + Thriller +
##   War
##
##              Df Sum of Sq    RSS    AIC
## - Horror        1      0.76  819.30 -619.32

```

```

## - Sci_Fi      1      0.87  819.41 -619.13
## - Biography   1      2.05  820.59 -617.09
## - Comedy      1      2.15  820.68 -616.93
## - Romance     1      2.32  820.86 -616.64
## - War         1      2.52  821.05 -616.30
## - Thriller    1      2.64  821.17 -616.09
## - History     1      2.77  821.31 -615.86
## - Musical     1      3.30  821.83 -614.96
## - Sport       1      3.34  821.87 -614.89
## - Family      1      3.42  821.96 -614.74
## <none>                818.54 -613.38
## - new_Year    2     13.43  831.97 -604.87
## - Animation   1     15.59  834.13 -593.96
## - final_Duration 2     28.56  847.10 -579.39
## - Drama       1     25.49  844.03 -577.28
## - Score       1     62.16  880.70 -517.14
## - Level       2    131.26  949.79 -417.59
## - log_Votes   1    706.29 1524.82  259.03
##
## Step:  AIC=-619.32
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Musical + Romance + Sci_Fi + Sport + Thriller + War
##
##           Df Sum of Sq    RSS    AIC
## - Sci_Fi      1      0.80  820.10 -625.19
## - Biography   1      2.20  821.50 -622.79
## - Romance     1      2.57  821.88 -622.13
## - War         1      2.68  821.99 -621.95
## - Thriller    1      2.75  822.05 -621.83
## - History     1      2.80  822.10 -621.75
## - Comedy      1      2.96  822.26 -621.47
## - Musical     1      3.21  822.52 -621.04
## - Sport       1      3.46  822.76 -620.61
## - Family      1      3.62  822.92 -620.34
## <none>                819.30 -619.32
## - new_Year    2     13.33  832.63 -611.01
## - Animation   1     16.09  835.39 -599.07
## - Drama       1     24.73  844.04 -584.52
## - final_Duration 2     31.32  850.62 -580.78
## - Score       1     61.65  880.95 -523.99
## - Level       2    143.06  962.36 -406.26
## - log_Votes   1    707.45 1526.75  253.57
##
## Step:  AIC=-625.19
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Biography + Comedy + Drama + Family + History +
##      Musical + Romance + Sport + Thriller + War
##
##           Df Sum of Sq    RSS    AIC
## - Biography   1      2.45  822.55 -628.23
## - War         1      2.82  822.92 -627.59
## - Romance     1      2.86  822.96 -627.53
## - History     1      2.94  823.05 -627.38

```

```

## - Thriller      1      3.35  823.46 -626.67
## - Musical       1      3.36  823.47 -626.66
## - Sport         1      3.67  823.78 -626.13
## - Comedy        1      3.92  824.02 -625.71
## - Family        1      4.04  824.14 -625.50
## <none>          1      820.10 -625.19
## - new_Year      2     13.29  833.39 -616.97
## - Animation     1     16.81  836.91 -603.75
## - Drama         1     23.93  844.04 -591.77
## - final_Duration 2     31.27  851.37 -586.79
## - Score         1     61.34  881.45 -530.45
## - Level         2    142.29  962.39 -413.47
## - log_Votes     1    710.29 1530.39  249.68
##
## Step:  AIC=-628.23
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Comedy + Drama + Family + History + Musical +
##      Romance + Sport + Thriller + War
##
##              Df Sum of Sq      RSS      AIC
## - Romance      1      2.17  824.72 -631.76
## - War           1      2.74  825.29 -630.78
## - Thriller      1      2.78  825.33 -630.71
## - Musical       1      3.36  825.91 -629.72
## - Comedy        1      3.75  826.30 -629.06
## - Sport         1      3.80  826.35 -628.96
## - Family        1      3.88  826.43 -628.83
## <none>          1      822.55 -628.23
## - History       1      4.24  826.80 -628.21
## - new_Year      2     12.57  835.12 -621.29
## - Animation     1     16.37  838.92 -607.63
## - Drama         1     22.29  844.84 -597.68
## - final_Duration 2     32.20  854.75 -588.44
## - Score         1     59.34  881.89 -536.99
## - Level         2    142.69  965.24 -416.54
## - log_Votes     1    712.50 1535.05  246.72
##
## Step:  AIC=-631.76
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Comedy + Drama + Family + History + Musical +
##      Sport + Thriller + War
##
##              Df Sum of Sq      RSS      AIC
## - Thriller      1      2.34  827.06 -635.01
## - War           1      2.67  827.39 -634.44
## - Sport         1      3.36  828.08 -633.27
## - Family        1      3.46  828.17 -633.11
## - Musical       1      3.68  828.40 -632.72
## - History       1      3.79  828.51 -632.54
## <none>          1      824.72 -631.76
## - Comedy        1      4.95  829.67 -630.55
## - new_Year      2     12.35  837.07 -625.26
## - Animation     1     15.68  840.40 -612.39
## - Drama         1     20.32  845.04 -604.60

```

```

## - final_Duration 2      31.58  856.30 -593.13
## - Score          1       59.52  884.24 -540.48
## - Level          2      147.33  972.05 -413.86
## - log_Votes      1      710.42 1535.14  239.55
##
## Step:  AIC=-635.01
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Comedy + Drama + Family + History + Musical +
##      Sport + War
##
##              Df Sum of Sq      RSS      AIC
## - War          1       2.37  829.43 -638.21
## - Family        1       2.98  830.04 -637.18
## - Sport          1       3.09  830.15 -636.98
## - Comedy         1       3.34  830.40 -636.57
## - Musical         1       3.48  830.55 -636.32
## - History         1       3.74  830.80 -635.89
## <none>              827.06 -635.01
## - new_Year        2      12.63  839.69 -628.09
## - Animation        1      15.10  842.16 -616.69
## - Drama            1      23.90  850.96 -601.98
## - final_Duration  2      31.33  858.39 -596.94
## - Score            1      60.09  887.15 -543.08
## - Level            2     145.05  972.11 -421.02
## - log_Votes        1     708.73 1535.79  232.90
##
## Step:  AIC=-638.21
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Comedy + Drama + Family + History + Musical +
##      Sport
##
##              Df Sum of Sq      RSS      AIC
## - Sport          1       3.02  832.46 -640.32
## - Family          1       3.04  832.47 -640.30
## - Comedy          1       3.20  832.63 -640.03
## - Musical          1       3.43  832.87 -639.62
## - History          1       3.93  833.37 -638.77
## <none>              829.43 -638.21
## - new_Year        2      12.87  842.30 -630.94
## - Animation        1      15.31  844.75 -619.60
## - Drama            1      23.48  852.91 -606.00
## - final_Duration  2      31.97  861.41 -599.24
## - Score            1      59.01  888.44 -548.28
## - Level            2     143.02  972.45 -427.79
## - log_Votes        1     706.59 1536.02  225.86
##
## Step:  AIC=-640.32
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##      Animation + Comedy + Drama + Family + History + Musical
##
##              Df Sum of Sq      RSS      AIC
## - Family          1       2.83  835.29 -642.77
## - Comedy           1       3.16  835.62 -642.21
## - Musical           1       3.33  835.79 -641.93

```

```

## - History          1          3.78  836.24 -641.16
## <none>              832.46 -640.32
## - new_Year         2          12.60  845.06 -633.58
## - Animation         1          14.72  847.18 -622.78
## - Drama             1          22.97  855.43 -609.09
## - final_Duration    2          31.28  863.74 -602.67
## - Score             1          58.10  890.56 -552.18
## - Level             2         147.37  979.83 -424.35
## - log_Votes         1         705.05 1537.51  219.97
##
## Step:  AIC=-642.77
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Comedy + Drama + History + Musical
##
##           Df Sum of Sq    RSS    AIC
## - Comedy      1      3.17  838.46 -644.67
## - Musical      1      3.25  838.54 -644.53
## - History      1      3.62  838.91 -643.91
## <none>          835.29 -642.77
## - new_Year     2     11.04  846.33 -638.72
## - Animation     1     12.32  847.61 -629.32
## - Drama         1     24.00  859.29 -609.97
## - final_Duration 2     31.62  866.91 -604.74
## - Score         1     58.64  893.93 -554.09
## - Level         2    176.63 1011.92 -386.04
## - log_Votes     1    703.65 1538.94  214.03
##
## Step:  AIC=-644.67
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Drama + History + Musical
##
##           Df Sum of Sq    RSS    AIC
## - Musical      1      3.26  841.72 -646.43
## - History      1      3.44  841.89 -646.14
## <none>          838.46 -644.67
## - new_Year     2     11.49  849.95 -639.92
## - Animation     1     12.98  851.43 -630.21
## - final_Duration 2     28.52  866.98 -611.87
## - Drama         1     25.59  864.05 -609.41
## - Score         1     59.05  897.51 -555.70
## - Level         2    182.66 1021.12 -380.49
## - log_Votes     1    702.61 1541.07  208.73
##
## Step:  AIC=-646.43
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Drama + History
##
##           Df Sum of Sq    RSS    AIC
## - History      1      3.68  845.40 -647.52
## <none>          841.72 -646.43
## - new_Year     2     11.17  852.89 -642.30
## - Animation     1     12.57  854.29 -632.73
## - final_Duration 2     28.55  870.27 -613.78
## - Drama         1     25.74  867.46 -611.09

```

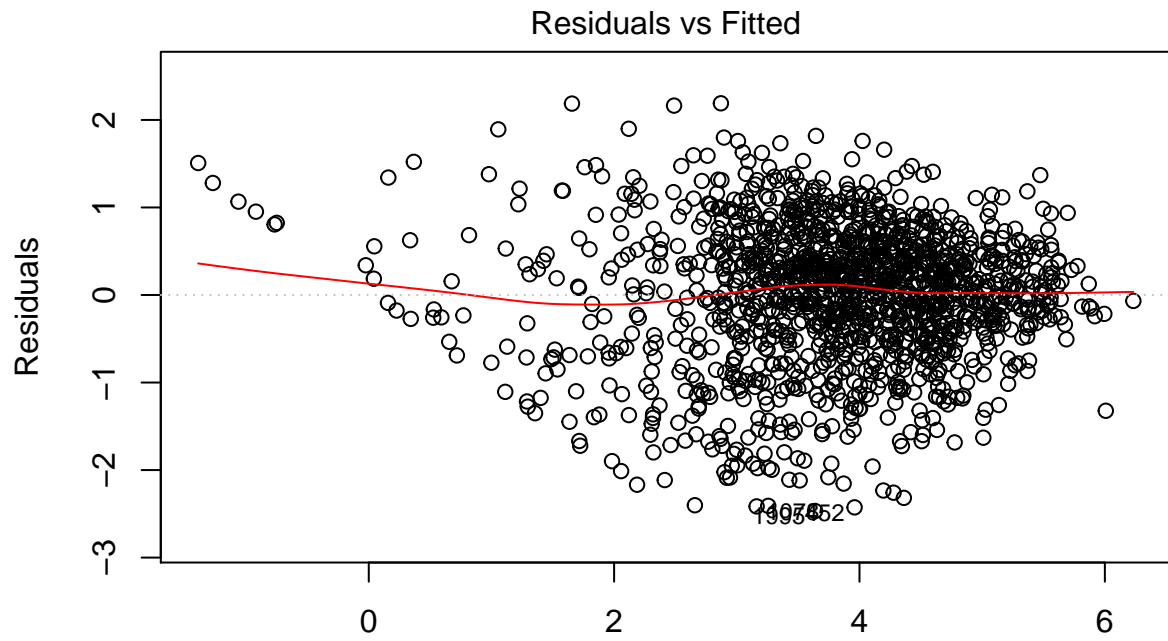


```
## - Score          1      57.99  899.71 -559.48
## - Level          2     187.33 1029.05 -376.81
## - log_Votes      1     701.80 1543.52  203.72
##
## Step:  AIC=-647.52
## log_gross ~ new_Year + Level + final_Duration + Score + log_Votes +
##   Animation + Drama
##
##              Df Sum of Sq    RSS    AIC
## <none>                845.40 -647.52
## - new_Year            2      10.70  856.09 -644.26
## - Animation           1      12.49  857.89 -634.04
## - Drama               1      23.98  869.38 -615.22
## - final_Duration     2      30.92  876.32 -611.24
## - Score              1      56.68  902.08 -563.02
## - Level              2     188.59 1033.99 -377.29
## - log_Votes          1     699.80 1545.20  198.00
```

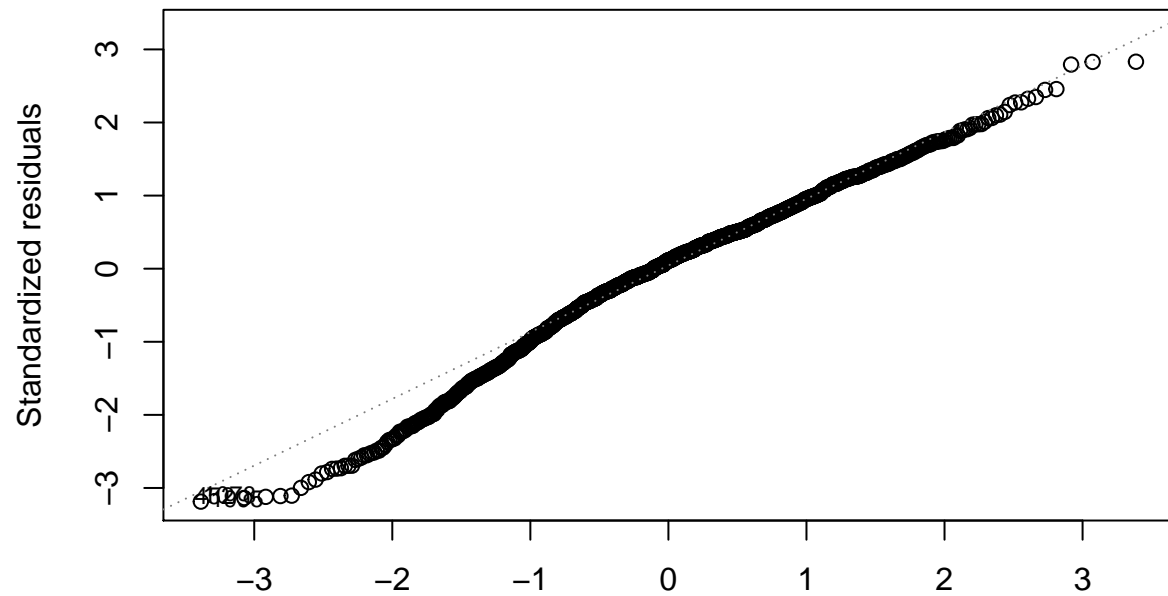
```
summary(mbic)
```

```
##
## Call:
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##   Score + log_Votes + Animation + Drama, data = datanml)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.46763 -0.44222  0.08769  0.50939  2.18998
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -1.79353    0.26020  -6.893 8.24e-12 ***
## new_Yearfirst_ten -0.23326    0.05762  -4.048 5.44e-05 ***
## new_Yearsecond_ten -0.18214    0.05506  -3.308 0.000964 ***
## LevelPG-13     -0.25615    0.07151  -3.582 0.000352 ***
## LevelR         -0.93855    0.06767 -13.870 < 2e-16 ***
## final_DurationNormal -0.29996    0.05091  -5.893 4.75e-09 ***
## final_DurationShort -0.41889    0.06264  -6.688 3.27e-11 ***
## Score          -0.30418    0.03136  -9.699 < 2e-16 ***
## log_Votes       0.74709    0.02192  34.079 < 2e-16 ***
## Animation       0.59917    0.13159   4.553 5.74e-06 ***
## Drama          -0.30303    0.04803  -6.309 3.76e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7763 on 1403 degrees of freedom
## Multiple R-squared:  0.6461, Adjusted R-squared:  0.6435
## F-statistic: 256.1 on 10 and 1403 DF,  p-value: < 2.2e-16
```

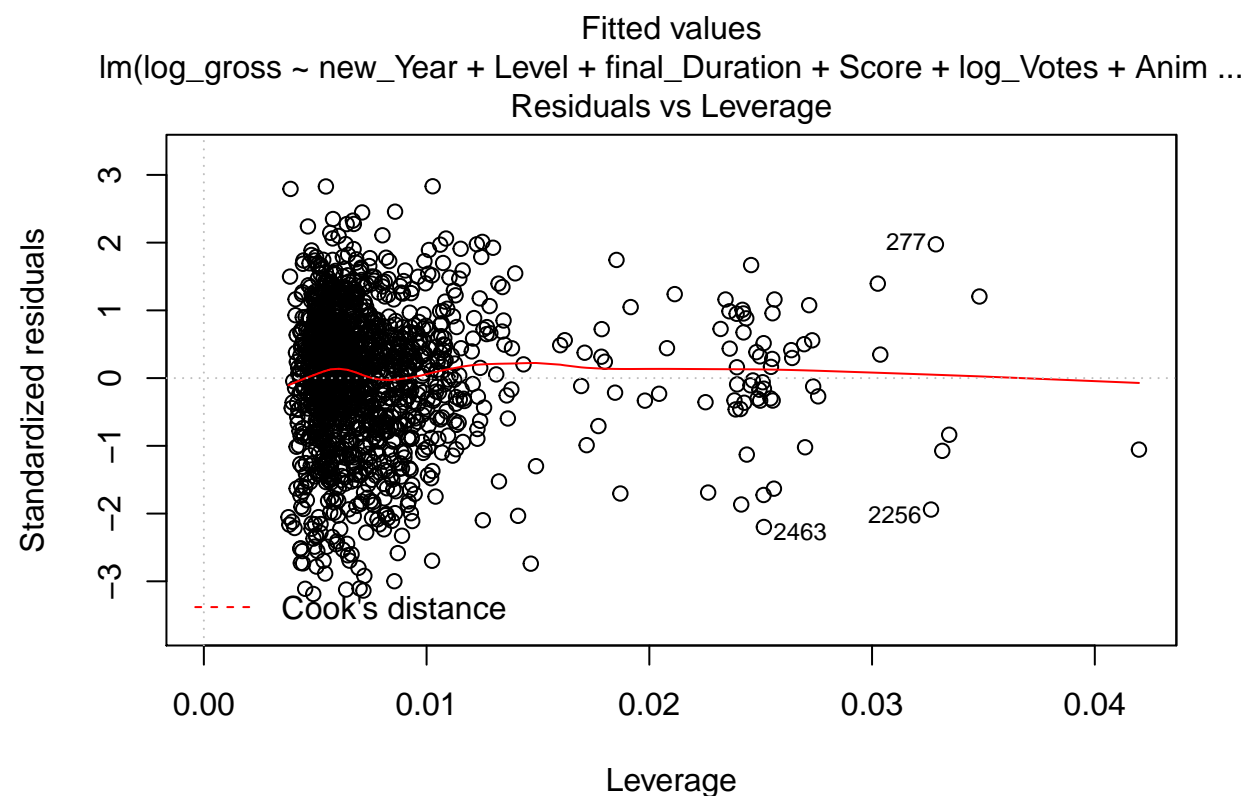
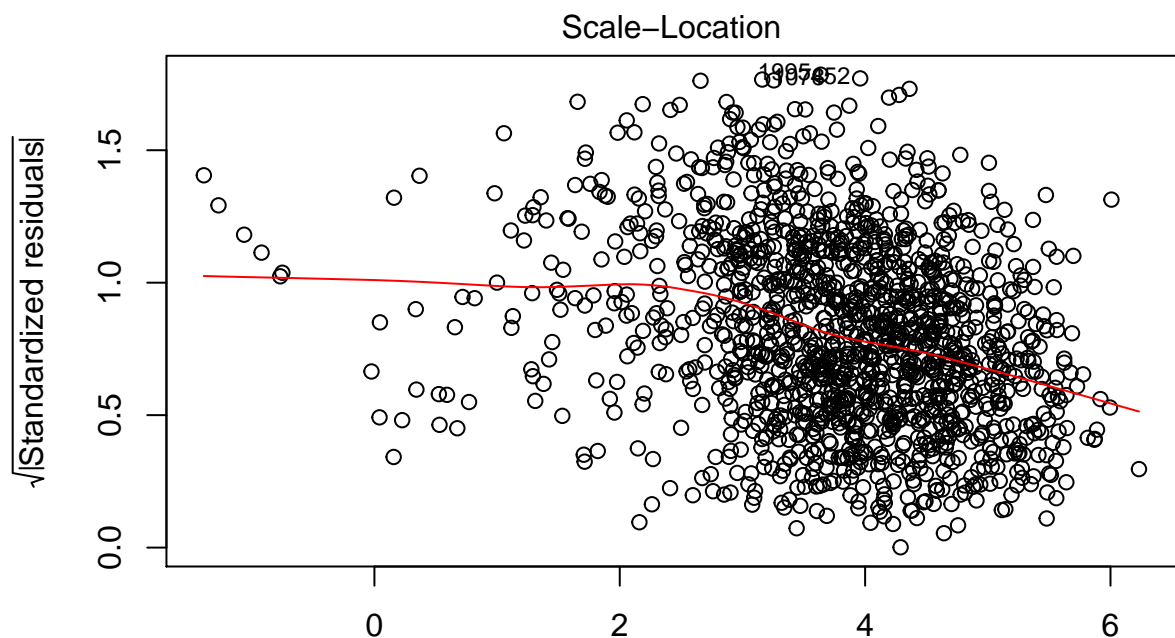
```
plot(mbic)
```



Im(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Anim ...
Normal Q-Q



Im(log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Anim ...



```
vif(mbic)
```

```
##          GVIF Df GVIF^(1/(2*Df))
## new_Year    1.282344  2    1.064146
## Level       1.437961  2    1.095057
## final_Duration 1.309637  2    1.069763
```

```

## Score          1.803437  1          1.342921
## log_Votes      1.715305  1          1.309696
## Animation      1.278942  1          1.130903
## Drama          1.351361  1          1.162480

#cross validation
mfinal2<-lm(formula = log_gross ~ new_Year + Level + final_Duration + Score + log_Votes + Animation + C
summary(mfinal2)

##
## Call:
## lm(formula = log_gross ~ new_Year + Level + final_Duration +
##     Score + log_Votes + Animation + Comedy + Drama + Sport, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.4551 -0.4522  0.1284  0.5933  2.2949
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -0.74908    0.47222  -1.586  0.11332
## new_Yearfirst_ten -0.14723    0.11624  -1.267  0.20590
## new_Yearsecond_ten  0.14097    0.10660   1.322  0.18668
## LevelPG-13      -0.49155    0.14848  -3.311  0.00100 **
## LevelR          -1.08863    0.14020  -7.765 4.87e-14 ***
## final_DurationNormal -0.52736    0.10121  -5.211 2.79e-07 ***
## final_DurationShort -0.64907    0.12606  -5.149 3.81e-07 ***
## Score          -0.32906    0.05800  -5.673 2.41e-08 ***
## log_Votes        0.67671    0.04184  16.173 < 2e-16 ***
## Animation        0.15732    0.25273   0.622  0.53391
## Comedy          0.20744    0.09840   2.108  0.03553 *
## Drama          -0.28625    0.09847  -2.907  0.00382 **
## Sport           0.11147    0.25163   0.443  0.65797
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9081 on 487 degrees of freedom
## Multiple R-squared:  0.5629, Adjusted R-squared:  0.5522
## F-statistic: 52.27 on 12 and 487 DF,  p-value: < 2.2e-16

#mfinal2 this is our final model

parameterset<-data.frame(new_Year="second_ten", Level="R", final_Duration="Long", Score=7.5, log_Votes=
result<-exp(predict(mfinal2, parameterset))
result

##          1
## 54.38436

```