Entrega1

Loading data and Sample selection

Pol Renau Miguel Angel Merino

Table of Contents

# Load data

Data is adult.data file located in the current active directory

df<-read.table("adult.data",header=F, sep=",",fill=FALSE, strip.white=TRUE,na.string="?")  
dim(df)

## [1] 32561 15

names(df)

## [1] "V1" "V2" "V3" "V4" "V5" "V6" "V7" "V8" "V9" "V10" "V11"  
## [12] "V12" "V13" "V14" "V15"

names(df)<-c("age", "type.employer", "fnlwgt", "education", "education.num","marital", "occupation",   
 "relationship", "race","sex", "capital.gain", "capital.loss",   
 "hr.per.week", "country", "y.bin")  
summary(df)

## age type.employer fnlwgt   
## Min. :17.00 Private :22696 Min. : 12285   
## 1st Qu.:28.00 Self-emp-not-inc: 2541 1st Qu.: 117827   
## Median :37.00 Local-gov : 2093 Median : 178356   
## Mean :38.58 State-gov : 1298 Mean : 189778   
## 3rd Qu.:48.00 Self-emp-inc : 1116 3rd Qu.: 237051   
## Max. :90.00 (Other) : 981 Max. :1484705   
## NA's : 1836   
## education education.num marital   
## HS-grad :10501 Min. : 1.00 Divorced : 4443   
## Some-college: 7291 1st Qu.: 9.00 Married-AF-spouse : 23   
## Bachelors : 5355 Median :10.00 Married-civ-spouse :14976   
## Masters : 1723 Mean :10.08 Married-spouse-absent: 418   
## Assoc-voc : 1382 3rd Qu.:12.00 Never-married :10683   
## 11th : 1175 Max. :16.00 Separated : 1025   
## (Other) : 5134 Widowed : 993   
## occupation relationship race   
## Prof-specialty : 4140 Husband :13193 Amer-Indian-Eskimo: 311   
## Craft-repair : 4099 Not-in-family : 8305 Asian-Pac-Islander: 1039   
## Exec-managerial: 4066 Other-relative: 981 Black : 3124   
## Adm-clerical : 3770 Own-child : 5068 Other : 271   
## Sales : 3650 Unmarried : 3446 White :27816   
## (Other) :10993 Wife : 1568   
## NA's : 1843   
## sex capital.gain capital.loss hr.per.week   
## Female:10771 Min. : 0 Min. : 0.0 Min. : 1.00   
## Male :21790 1st Qu.: 0 1st Qu.: 0.0 1st Qu.:40.00   
## Median : 0 Median : 0.0 Median :40.00   
## Mean : 1078 Mean : 87.3 Mean :40.44   
## 3rd Qu.: 0 3rd Qu.: 0.0 3rd Qu.:45.00   
## Max. :99999 Max. :4356.0 Max. :99.00   
##   
## country y.bin   
## United-States:29170 <=50K:24720   
## Mexico : 643 >50K : 7841   
## Philippines : 198   
## Germany : 137   
## Canada : 121   
## (Other) : 1709   
## NA's : 583

## Sample selection

You have to initialize generator seed and select a personal sample of 5000 observations

set.seed(14121997)  
sam<-sort(sample(1:nrow(df),5000))  
  
  
str(df)

## 'data.frame': 32561 obs. of 15 variables:  
## $ age : int 39 50 38 53 28 37 49 52 31 42 ...  
## $ type.employer: Factor w/ 8 levels "Federal-gov",..: 7 6 4 4 4 4 4 6 4 4 ...  
## $ fnlwgt : int 77516 83311 215646 234721 338409 284582 160187 209642 45781 159449 ...  
## $ education : Factor w/ 16 levels "10th","11th",..: 10 10 12 2 10 13 7 12 13 10 ...  
## $ education.num: int 13 13 9 7 13 14 5 9 14 13 ...  
## $ marital : Factor w/ 7 levels "Divorced","Married-AF-spouse",..: 5 3 1 3 3 3 4 3 5 3 ...  
## $ occupation : Factor w/ 14 levels "Adm-clerical",..: 1 4 6 6 10 4 8 4 10 4 ...  
## $ relationship : Factor w/ 6 levels "Husband","Not-in-family",..: 2 1 2 1 6 6 2 1 2 1 ...  
## $ race : Factor w/ 5 levels "Amer-Indian-Eskimo",..: 5 5 5 3 3 5 3 5 5 5 ...  
## $ sex : Factor w/ 2 levels "Female","Male": 2 2 2 2 1 1 1 2 1 2 ...  
## $ capital.gain : int 2174 0 0 0 0 0 0 0 14084 5178 ...  
## $ capital.loss : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ hr.per.week : int 40 13 40 40 40 40 16 45 50 40 ...  
## $ country : Factor w/ 41 levels "Cambodia","Canada",..: 39 39 39 39 5 39 23 39 39 39 ...  
## $ y.bin : Factor w/ 2 levels "<=50K",">50K": 1 1 1 1 1 1 1 2 2 2 ...

# Select sample  
df<-df[sam,]

### Save sample binary file

save(list="df",file="mostra.RData")

# Income Census Dataset

## Description

*Input variables:*

1. age: continuous.
2. workclass: Private, Self-emp-not-inc, Self-emp-inc, Federal-gov, Local-gov, State-gov, Without-pay, Never-worked.
3. fnlwgt: continuous.
4. education: Bachelors, Some-college, 11th, HS-grad, Prof-school, Assoc-acdm, Assoc-voc, 9th, 7th-8th, 12th, Masters, 1st-4th, 10th, Doctorate, 5th-6th, Preschool.
5. education-num: continuous.
6. marital.status: Married-civ-spouse, Divorced, Never-married, Separated, Widowed, Married-spouse-absent, Married-AF-spouse.
7. occupation: Tech-support, Craft-repair, Other-service, Sales, Exec-managerial, Prof-specialty, Handlers-cleaners, Machine-op-inspct, Adm-clerical, Farming-fishing, Transport-moving, Priv-house-serv, Protective-serv, Armed-Forces.
8. relationship: Wife, Own-child, Husband, Not-in-family, Other-relative, Unmarried.
9. race: White, Asian-Pac-Islander, Amer-Indian-Eskimo, Other, Black.
10. sex: Female, Male.
11. capital.gain: continuous.
12. capital.loss: continuous.
13. hours.per.week: continuous. Numeric target.
14. native.country: United-States, Cambodia, England, Puerto-Rico, Canada, Germany, Outlying-US(Guam-USVI-etc), India, Japan, Greece, South, China, Cuba, Iran, Honduras, Philippines, Italy, Poland, Jamaica, Vietnam, Mexico, Portugal, Ireland, France, Dominican-Republic, Laos, Ecuador, Taiwan, Haiti, Columbia, Hungary, Guatemala, Nicaragua, Scotland, Thailand, Yugoslavia, El-Salvador, Trinadad&Tobago, Peru, Hong, Holand-Netherlands.
15. y.bin: Making more than $50K per year. Binary target.

## Load Packages

Carregarem tots els paquets necessaris per utilitzar al llarg de la pràctica.

options(contrasts=c("contr.treatment","contr.treatment"))  
  
requiredPackages <- c("effects","FactoMineR","car", "factoextra","ggplot2","dplyr","ggmap","ggthemes","knitr")  
missingPackages <- requiredPackages[!(requiredPackages %in% installed.packages()[,"Package"])]  
if(length(missingPackages)) install.packages(missingPackages)

## Installing packages into '/home/pol/R/x86\_64-pc-linux-gnu-library/3.4'  
## (as 'lib' is unspecified)

## Warning: packages 'effects', 'car' are not available (for R version 3.4.4)

## Warning: dependencies 'car', 'cowplot' are not available

## also installing the dependency 'ggpubr'

## Warning in install.packages(missingPackages): installation of package  
## 'ggpubr' had non-zero exit status

## Warning in install.packages(missingPackages): installation of package  
## 'FactoMineR' had non-zero exit status

## Warning in install.packages(missingPackages): installation of package  
## 'factoextra' had non-zero exit status

lapply(requiredPackages, require, character.only = TRUE)

## Loading required package: effects

## Warning in library(package, lib.loc = lib.loc, character.only = TRUE,  
## logical.return = TRUE, : there is no package called 'effects'

## Loading required package: FactoMineR

## Warning in library(package, lib.loc = lib.loc, character.only = TRUE,  
## logical.return = TRUE, : there is no package called 'FactoMineR'

## Loading required package: car

## Warning in library(package, lib.loc = lib.loc, character.only = TRUE,  
## logical.return = TRUE, : there is no package called 'car'

## Loading required package: factoextra

## Warning in library(package, lib.loc = lib.loc, character.only = TRUE,  
## logical.return = TRUE, : there is no package called 'factoextra'

## Loading required package: ggplot2

## Loading required package: dplyr

##   
## 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

## Loading required package: ggmap

## Google's Terms of Service: https://cloud.google.com/maps-platform/terms/.

## Please cite ggmap if you use it! See citation("ggmap") for details.

## Loading required package: ggthemes

## Loading required package: knitr

## [[1]]  
## [1] FALSE  
##   
## [[2]]  
## [1] FALSE  
##   
## [[3]]  
## [1] FALSE  
##   
## [[4]]  
## [1] FALSE  
##   
## [[5]]  
## [1] TRUE  
##   
## [[6]]  
## [1] TRUE  
##   
## [[7]]  
## [1] TRUE  
##   
## [[8]]  
## [1] TRUE  
##   
## [[9]]  
## [1] TRUE

## Load Sample

Carreguem el model previament creat.

# Clear objects  
rm(list=ls())  
# Clear plots  
if(!is.null(dev.list())) dev.off()

## null device   
## 1

# Command or Windows-like method  
load("mostra.RData")  
summary(df)

## age type.employer fnlwgt   
## Min. :17.00 Private :3476 Min. : 13769   
## 1st Qu.:27.00 Self-emp-not-inc: 400 1st Qu.: 117844   
## Median :36.00 Local-gov : 320 Median : 178130   
## Mean :38.18 State-gov : 214 Mean : 191672   
## 3rd Qu.:47.00 Self-emp-inc : 160 3rd Qu.: 240818   
## Max. :90.00 (Other) : 142 Max. :1268339   
## NA's : 288   
## education education.num marital   
## HS-grad :1589 Min. : 1.00 Divorced : 677   
## Some-college:1161 1st Qu.: 9.00 Married-AF-spouse : 2   
## Bachelors : 808 Median :10.00 Married-civ-spouse :2293   
## Masters : 260 Mean :10.05 Married-spouse-absent: 68   
## Assoc-voc : 210 3rd Qu.:12.00 Never-married :1669   
## Assoc-acdm : 166 Max. :16.00 Separated : 144   
## (Other) : 806 Widowed : 147   
## occupation relationship race   
## Craft-repair : 619 Husband :1986 Amer-Indian-Eskimo: 46   
## Exec-managerial: 608 Not-in-family :1280 Asian-Pac-Islander: 171   
## Prof-specialty : 587 Other-relative: 143 Black : 453   
## Adm-clerical : 586 Own-child : 805 Other : 41   
## Sales : 553 Unmarried : 518 White :4289   
## (Other) :1758 Wife : 268   
## NA's : 289   
## sex capital.gain capital.loss hr.per.week   
## Female:1685 Min. : 0.0 Min. : 0.00 Min. : 1.00   
## Male :3315 1st Qu.: 0.0 1st Qu.: 0.00 1st Qu.:40.00   
## Median : 0.0 Median : 0.00 Median :40.00   
## Mean : 922.1 Mean : 87.12 Mean :40.55   
## 3rd Qu.: 0.0 3rd Qu.: 0.00 3rd Qu.:45.00   
## Max. :99999.0 Max. :3900.00 Max. :99.00   
##   
## country y.bin   
## United-States:4452 <=50K:3814   
## Mexico : 109 >50K :1186   
## Philippines : 28   
## England : 21   
## Vietnam : 20   
## (Other) : 281   
## NA's : 89

#Some useful functions Definim totes les funcions que ens podran ser utils al llarg de la pràctica.

calcQ <- function(x) {  
 s.x <- summary(x)  
 iqr<-s.x[5]-s.x[2]  
 list(souti=s.x[2]-3\*iqr, mouti=s.x[2]-1.5\*iqr, min=s.x[1], q1=s.x[2], q2=s.x[3],   
 q3=s.x[5], max=s.x[6], mouts=s.x[5]+1.5\*iqr, souts=s.x[5]+3\*iqr ) }  
  
countNA <- function(x) {  
 mis\_x <- NULL  
 for (j in 1:ncol(x)) {mis\_x[j] <- sum(is.na(x[,j])) }  
 mis\_x <- as.data.frame(mis\_x)  
 rownames(mis\_x) <- names(x)  
 mis\_i <- rep(0,nrow(x))  
 for (j in 1:ncol(x)) {mis\_i <- mis\_i + as.numeric(is.na(x[,j])) }  
 list(mis\_col=mis\_x,mis\_ind=mis\_i) }

# Data Preparation

Preparació de les dades, separem entre aquelles variables que tenen un valor numeric i aquelles que són descriptives

names(df)

## [1] "age" "type.employer" "fnlwgt" "education"   
## [5] "education.num" "marital" "occupation" "relationship"   
## [9] "race" "sex" "capital.gain" "capital.loss"   
## [13] "hr.per.week" "country" "y.bin"

vars\_con<-names(df)[c(1,3,5,11:13)];vars\_con

## [1] "age" "fnlwgt" "education.num" "capital.gain"   
## [5] "capital.loss" "hr.per.week"

vars\_dis<-names(df)[c(2,4,6:10,14:15)];vars\_dis

## [1] "type.employer" "education" "marital" "occupation"   
## [5] "relationship" "race" "sex" "country"   
## [9] "y.bin"

summary(df[,vars\_con]) # Example of descriptive for numeric variables

## age fnlwgt education.num capital.gain   
## Min. :17.00 Min. : 13769 Min. : 1.00 Min. : 0.0   
## 1st Qu.:27.00 1st Qu.: 117844 1st Qu.: 9.00 1st Qu.: 0.0   
## Median :36.00 Median : 178130 Median :10.00 Median : 0.0   
## Mean :38.18 Mean : 191672 Mean :10.05 Mean : 922.1   
## 3rd Qu.:47.00 3rd Qu.: 240818 3rd Qu.:12.00 3rd Qu.: 0.0   
## Max. :90.00 Max. :1268339 Max. :16.00 Max. :99999.0   
## capital.loss hr.per.week   
## Min. : 0.00 Min. : 1.00   
## 1st Qu.: 0.00 1st Qu.:40.00   
## Median : 0.00 Median :40.00   
## Mean : 87.12 Mean :40.55   
## 3rd Qu.: 0.00 3rd Qu.:45.00   
## Max. :3900.00 Max. :99.00

summary(df[,vars\_dis])

## type.employer education marital   
## Private :3476 HS-grad :1589 Divorced : 677   
## Self-emp-not-inc: 400 Some-college:1161 Married-AF-spouse : 2   
## Local-gov : 320 Bachelors : 808 Married-civ-spouse :2293   
## State-gov : 214 Masters : 260 Married-spouse-absent: 68   
## Self-emp-inc : 160 Assoc-voc : 210 Never-married :1669   
## (Other) : 142 Assoc-acdm : 166 Separated : 144   
## NA's : 288 (Other) : 806 Widowed : 147   
## occupation relationship race   
## Craft-repair : 619 Husband :1986 Amer-Indian-Eskimo: 46   
## Exec-managerial: 608 Not-in-family :1280 Asian-Pac-Islander: 171   
## Prof-specialty : 587 Other-relative: 143 Black : 453   
## Adm-clerical : 586 Own-child : 805 Other : 41   
## Sales : 553 Unmarried : 518 White :4289   
## (Other) :1758 Wife : 268   
## NA's : 289   
## sex country y.bin   
## Female:1685 United-States:4452 <=50K:3814   
## Male :3315 Mexico : 109 >50K :1186   
## Philippines : 28   
## England : 21   
## Vietnam : 20   
## (Other) : 281   
## NA's : 89

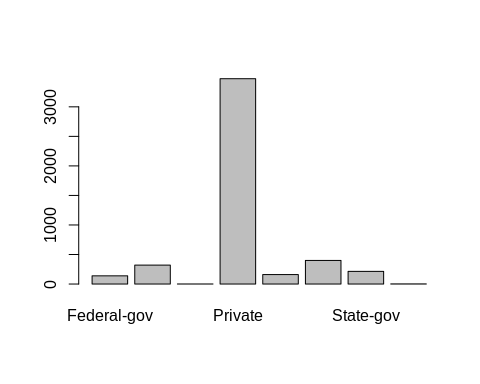
# Factor preparation

## type.employer

levels(df$type.employer)

## [1] "Federal-gov" "Local-gov" "Never-worked"   
## [4] "Private" "Self-emp-inc" "Self-emp-not-inc"  
## [7] "State-gov" "Without-pay"

# Graphic tool for Univ EDA and factors  
barplot(table(df$type.employer))



table(df$type.employer)

##   
## Federal-gov Local-gov Never-worked Private   
## 139 320 1 3476   
## Self-emp-inc Self-emp-not-inc State-gov Without-pay   
## 160 400 214 2

# Conceptual decission : federal, local and state gov are grouped together - Private alone , Self-emp and the rest together  
  
# Use target means  
  
tapply(df$hr.per.week,df$type.employer,mean)

## Federal-gov Local-gov Never-worked Private   
## 40.67626 40.85938 4.00000 40.38003   
## Self-emp-inc Self-emp-not-inc State-gov Without-pay   
## 47.97500 45.73750 39.46262 33.00000

df$f.type<-1  
ll<-which(df$type.employer == "Private");length(ll)

## [1] 3476

df$f.type[ll]<-2  
df[ll,"f.type"]<-2 # f.type already available  
ll<-which(df$type.employer == "Self-emp-inc");length(ll)

## [1] 160

df$f.type[ll]<-3  
ll<-which(df$type.employer %in% c("Self-emp-not-inc","Never-worked","Without-pay"));length(ll)

## [1] 403

df$f.type[ll]<-4  
  
# Define f.type as a factor and use 'nice' level names  
  
paste0("f.typ-",c("Civil","Private","SelfEm","Other"))

## [1] "f.typ-Civil" "f.typ-Private" "f.typ-SelfEm" "f.typ-Other"

df$f.type<-factor(df$f.type,levels=1:4,labels=paste0("f.typ-",c("Civil","Private","SelfEm","Other")))  
  
summary(df$f.type)

## f.typ-Civil f.typ-Private f.typ-SelfEm f.typ-Other   
## 961 3476 160 403

## Sex - Change label names

levels(df$sex)<-paste0("Sex-",levels(df$sex))  
summary(df$sex)

## Sex-Female Sex-Male   
## 1685 3315

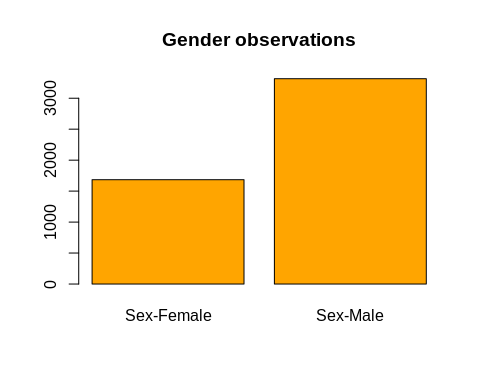
# Univariant EDA   
100\*table(df$sex)/nrow(df)

##   
## Sex-Female Sex-Male   
## 33.7 66.3

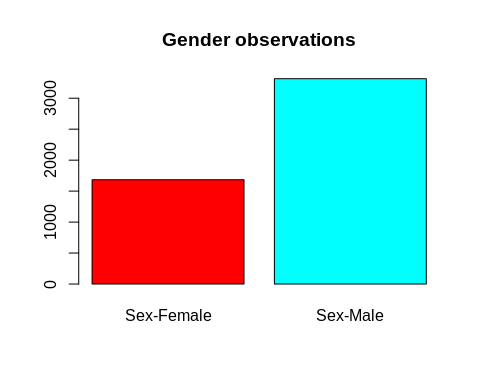
prop.table(table(df$sex))

##   
## Sex-Female Sex-Male   
## 0.337 0.663

# Graphic tools  
barplot(table(df$sex),main="Gender observations",col="orange")



barplot(table(df$sex),main="Gender observations",col=rainbow(2))



## Numeric variables - Discretization

### Age

summary(df$age)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 17.00 27.00 36.00 38.18 47.00 90.00

# Try 4 categories first  
quantile(df$age)

## 0% 25% 50% 75% 100%   
## 17 27 36 47 90

cut(df$age,quantile(df$age))

## [1] (17,27] (36,47] (27,36] (27,36] (17,27] (47,90] (17,27] (47,90]  
## [9] (27,36] (47,90] (17,27] (27,36] (27,36] (36,47] (27,36] (47,90]  
## [17] (36,47] (17,27] (47,90] (17,27] (17,27] (27,36] (27,36] (17,27]  
## [25] (36,47] (36,47] (27,36] (27,36] (17,27] (47,90] (47,90] (47,90]  
## [33] (47,90] (17,27] (17,27] (36,47] (36,47] (27,36] (36,47] (17,27]  
## [41] (17,27] (17,27] (27,36] (17,27] (47,90] (17,27] (17,27] (27,36]  
## [49] (47,90] (36,47] (17,27] (17,27] (27,36] (36,47] (27,36] (47,90]  
## [57] <NA> (36,47] (27,36] (17,27] (36,47] (17,27] <NA> (27,36]  
## [65] (27,36] (36,47] (17,27] (17,27] (36,47] (47,90] (27,36] (27,36]  
## [73] (36,47] (36,47] (17,27] (47,90] (17,27] (27,36] (27,36] (36,47]  
## [81] (27,36] (17,27] (27,36] (47,90] (47,90] (17,27] (27,36] (47,90]  
## [89] (27,36] (17,27] (47,90] (27,36] (36,47] (27,36] (27,36] (36,47]  
## [97] (47,90] (27,36] (17,27] (36,47] (47,90] (47,90] (47,90] (36,47]  
## [105] (47,90] (36,47] (27,36] (47,90] <NA> (47,90] (47,90] (36,47]  
## [113] (27,36] (27,36] (47,90] (17,27] (27,36] (27,36] (36,47] (47,90]  
## [121] (36,47] (27,36] (36,47] (17,27] (36,47] (27,36] (47,90] (17,27]  
## [129] (36,47] (17,27] (17,27] (36,47] (27,36] (27,36] (27,36] (17,27]  
## [137] (36,47] (47,90] (36,47] (36,47] (17,27] (47,90] (17,27] (36,47]  
## [145] (47,90] (47,90] (27,36] (27,36] (27,36] (47,90] (47,90] (36,47]  
## [153] (36,47] (17,27] (47,90] (27,36] (27,36] (17,27] (27,36] (36,47]  
## [161] (27,36] (36,47] (36,47] (27,36] (47,90] (47,90] (17,27] (27,36]  
## [169] (36,47] (47,90] (17,27] (47,90] (36,47] (17,27] (27,36] (47,90]  
## [177] (47,90] (27,36] (27,36] (47,90] (27,36] (36,47] (36,47] (27,36]  
## [185] (47,90] (36,47] (36,47] (27,36] (27,36] (27,36] (47,90] (17,27]  
## [193] (17,27] (17,27] (47,90] (47,90] (36,47] (36,47] (47,90] (17,27]  
## [201] (36,47] (47,90] (17,27] (17,27] (36,47] (17,27] (47,90] (27,36]  
## [209] (27,36] (27,36] (36,47] (47,90] (27,36] (47,90] (27,36] (27,36]  
## [217] (36,47] (47,90] (36,47] <NA> (36,47] (47,90] (17,27] (27,36]  
## [225] (17,27] (47,90] (36,47] (47,90] <NA> (17,27] (36,47] (17,27]  
## [233] (17,27] (17,27] (27,36] (36,47] (27,36] (36,47] (27,36] (36,47]  
## [241] (36,47] (36,47] (36,47] (36,47] (27,36] (27,36] (47,90] (17,27]  
## [249] (36,47] (17,27] (47,90] (27,36] (36,47] (47,90] (36,47] (47,90]  
## [257] (17,27] (36,47] (27,36] (47,90] (36,47] (17,27] (47,90] (27,36]  
## [265] (47,90] (27,36] (47,90] (36,47] (17,27] (36,47] (47,90] (36,47]  
## [273] (17,27] (27,36] (47,90] (17,27] (27,36] (17,27] (17,27] (47,90]  
## [281] (36,47] (36,47] (17,27] (27,36] (47,90] (36,47] (36,47] (27,36]  
## [289] (27,36] (47,90] (27,36] (47,90] (47,90] (27,36] (47,90] (36,47]  
## [297] (17,27] (27,36] (17,27] (27,36] (17,27] (36,47] (17,27] (27,36]  
## [305] (27,36] (27,36] (17,27] (36,47] (47,90] (47,90] (17,27] (17,27]  
## [313] (17,27] (27,36] (17,27] (47,90] (27,36] (17,27] (36,47] (47,90]  
## [321] (47,90] (17,27] (27,36] (36,47] (36,47] (36,47] (27,36] (36,47]  
## [329] (47,90] (36,47] (17,27] (27,36] (17,27] (17,27] (36,47] (36,47]  
## [337] (47,90] (36,47] (17,27] (17,27] (36,47] (17,27] (27,36] (27,36]  
## [345] (36,47] (17,27] (27,36] (17,27] (17,27] (36,47] (36,47] (47,90]  
## [353] (36,47] (47,90] (27,36] (27,36] (47,90] (17,27] (17,27] (17,27]  
## [361] (27,36] (17,27] (17,27] (27,36] (36,47] (36,47] (17,27] (27,36]  
## [369] (47,90] (17,27] (17,27] (36,47] (27,36] (47,90] (47,90] (27,36]  
## [377] (17,27] (47,90] (36,47] (36,47] (27,36] (36,47] (27,36] (17,27]  
## [385] (27,36] (27,36] (36,47] (36,47] (47,90] (36,47] (27,36] (27,36]  
## [393] (36,47] (36,47] (47,90] (47,90] (27,36] (36,47] (27,36] (36,47]  
## [401] (36,47] (27,36] (27,36] (17,27] (17,27] (17,27] (36,47] (47,90]  
## [409] (17,27] (47,90] (47,90] (17,27] (36,47] (47,90] (36,47] (27,36]  
## [417] (47,90] (27,36] (17,27] (27,36] (36,47] (36,47] (36,47] (47,90]  
## [425] (27,36] (36,47] (27,36] (17,27] (36,47] (36,47] (36,47] (36,47]  
## [433] (17,27] (27,36] (27,36] (36,47] (17,27] (27,36] (17,27] (27,36]  
## [441] (17,27] (47,90] (47,90] (47,90] (17,27] (17,27] (27,36] (27,36]  
## [449] (27,36] (27,36] (47,90] (27,36] (27,36] (47,90] (17,27] (27,36]  
## [457] (27,36] (36,47] (47,90] (27,36] (17,27] (36,47] (17,27] (47,90]  
## [465] (17,27] (17,27] (17,27] (17,27] (17,27] (36,47] (17,27] (36,47]  
## [473] (17,27] (27,36] (36,47] (47,90] (36,47] (27,36] (36,47] (36,47]  
## [481] (36,47] (47,90] (27,36] (36,47] (27,36] (17,27] (36,47] (36,47]  
## [489] (47,90] (17,27] (17,27] (36,47] (17,27] (17,27] (47,90] (27,36]  
## [497] (36,47] (36,47] (36,47] (36,47] (36,47] (36,47] (36,47] (17,27]  
## [505] (36,47] (47,90] (36,47] (36,47] (47,90] (27,36] (27,36] (47,90]  
## [513] (36,47] (27,36] <NA> (17,27] (17,27] (27,36] (17,27] (27,36]  
## [521] (36,47] (17,27] (17,27] (47,90] (36,47] (47,90] (27,36] (27,36]  
## [529] (17,27] (27,36] (47,90] (36,47] <NA> (27,36] (47,90] (36,47]  
## [537] (47,90] (36,47] (47,90] (47,90] (36,47] (47,90] (47,90] (17,27]  
## [545] (27,36] <NA> (27,36] (27,36] (36,47] (17,27] (27,36] (27,36]  
## [553] (36,47] (17,27] (36,47] (36,47] (27,36] (17,27] (36,47] (27,36]  
## [561] (27,36] (36,47] (47,90] (47,90] (47,90] (47,90] (47,90] (47,90]  
## [569] (27,36] (36,47] (47,90] (47,90] (17,27] (17,27] (47,90] (36,47]  
## [577] (27,36] (47,90] (27,36] (17,27] (17,27] (47,90] (47,90] (47,90]  
## [585] (17,27] (27,36] (36,47] (47,90] (47,90] (17,27] (47,90] (27,36]  
## [593] (27,36] (47,90] (36,47] (36,47] (36,47] (36,47] (17,27] (47,90]  
## [601] (47,90] (47,90] (17,27] (27,36] (27,36] (36,47] (47,90] (36,47]  
## [609] (27,36] (17,27] (36,47] (17,27] (47,90] (27,36] (17,27] (47,90]  
## [617] (36,47] (27,36] (27,36] (36,47] (36,47] (36,47] (17,27] (36,47]  
## [625] (47,90] (27,36] (36,47] (17,27] (47,90] (17,27] (17,27] (47,90]  
## [633] <NA> (47,90] (47,90] (17,27] (47,90] (27,36] (17,27] (27,36]  
## [641] (17,27] (17,27] (47,90] (17,27] (47,90] (36,47] (17,27] (36,47]  
## [649] (17,27] (17,27] (17,27] (47,90] (27,36] (27,36] (47,90] (27,36]  
## [657] (47,90] (27,36] (17,27] (27,36] (47,90] (17,27] (27,36] (36,47]  
## [665] (17,27] (47,90] (47,90] (47,90] (17,27] (17,27] (17,27] (17,27]  
## [673] (27,36] (17,27] (36,47] (47,90] (17,27] (17,27] (36,47] (17,27]  
## [681] (36,47] (36,47] (17,27] (36,47] (47,90] (17,27] (27,36] (17,27]  
## [689] (17,27] (17,27] (17,27] (17,27] (47,90] (36,47] (17,27] (17,27]  
## [697] (27,36] (27,36] (36,47] (47,90] (17,27] (47,90] (27,36] (47,90]  
## [705] (36,47] (27,36] (47,90] (47,90] (27,36] (17,27] (27,36] (47,90]  
## [713] (17,27] (36,47] (27,36] (27,36] (47,90] (27,36] (36,47] (17,27]  
## [721] (17,27] (17,27] (17,27] (47,90] (27,36] (36,47] (17,27] (27,36]  
## [729] (17,27] (27,36] (27,36] (47,90] (27,36] (17,27] (47,90] (17,27]  
## [737] (36,47] (17,27] (17,27] (17,27] (27,36] (27,36] (36,47] (27,36]  
## [745] (17,27] (17,27] (36,47] (36,47] (36,47] (17,27] (27,36] (27,36]  
## [753] (27,36] (36,47] (27,36] (36,47] (36,47] (36,47] (36,47] (47,90]  
## [761] (27,36] (36,47] (36,47] (17,27] (27,36] (47,90] (27,36] (36,47]  
## [769] (27,36] (17,27] (27,36] (47,90] (47,90] (27,36] (17,27] (47,90]  
## [777] (17,27] (27,36] (47,90] (27,36] (27,36] (36,47] (47,90] (27,36]  
## [785] (47,90] (47,90] (47,90] (36,47] (27,36] (27,36] (36,47] (36,47]  
## [793] (47,90] (27,36] (36,47] (27,36] (27,36] (47,90] (36,47] (36,47]  
## [801] (36,47] (17,27] (27,36] (36,47] (47,90] (17,27] (27,36] (47,90]  
## [809] (36,47] (17,27] (47,90] (47,90] (47,90] (47,90] (27,36] (47,90]  
## [817] (17,27] (27,36] (27,36] (27,36] (27,36] (36,47] (27,36] (36,47]  
## [825] (47,90] (17,27] (47,90] (47,90] (27,36] (27,36] (17,27] (47,90]  
## [833] (27,36] (36,47] (36,47] (36,47] (17,27] <NA> (17,27] (47,90]  
## [841] (47,90] (47,90] (47,90] (47,90] (27,36] (17,27] (17,27] (17,27]  
## [849] (47,90] (47,90] (27,36] (17,27] (27,36] (47,90] (17,27] (27,36]  
## [857] (47,90] (17,27] (47,90] (27,36] (27,36] (47,90] (27,36] (47,90]  
## [865] (47,90] (36,47] (17,27] (27,36] (47,90] (36,47] (27,36] (47,90]  
## [873] (27,36] (27,36] (27,36] (27,36] (47,90] (47,90] (36,47] (27,36]  
## [881] (36,47] (27,36] (36,47] (36,47] (36,47] (17,27] (17,27] (47,90]  
## [889] (27,36] (47,90] (47,90] (36,47] (27,36] (47,90] (27,36] <NA>   
## [897] (47,90] (17,27] (47,90] (36,47] (17,27] (27,36] (36,47] (47,90]  
## [905] (47,90] (27,36] (36,47] (17,27] (36,47] (27,36] (47,90] (17,27]  
## [913] (17,27] (47,90] (36,47] (27,36] (47,90] (27,36] (36,47] (47,90]  
## [921] (36,47] (36,47] (17,27] (36,47] (27,36] (36,47] (27,36] (17,27]  
## [929] (17,27] (47,90] (36,47] (17,27] (17,27] (17,27] (47,90] (47,90]  
## [937] (36,47] (27,36] (47,90] (47,90] (17,27] (27,36] (36,47] (36,47]  
## [945] (36,47] (47,90] (27,36] (47,90] (36,47] (27,36] (47,90] (36,47]  
## [953] (47,90] (27,36] (27,36] (27,36] (47,90] (47,90] (27,36] (27,36]  
## [961] (36,47] (17,27] (27,36] (17,27] (17,27] (36,47] (47,90] (17,27]  
## [969] (36,47] (36,47] (47,90] (47,90] (27,36] (36,47] (17,27] (47,90]  
## [977] (36,47] (17,27] (17,27] (36,47] (36,47] (47,90] (36,47] (47,90]  
## [985] (17,27] (36,47] (27,36] (17,27] (36,47] (17,27] (17,27] (47,90]  
## [993] (36,47] (27,36] (27,36] (36,47] <NA> (17,27] (27,36] (17,27]  
## [1001] (36,47] (27,36] (36,47] (36,47] (36,47] (36,47] (36,47] (36,47]  
## [1009] (47,90] (36,47] (36,47] (17,27] (47,90] (27,36] (17,27] (27,36]  
## [1017] (27,36] (17,27] (47,90] (27,36] (17,27] (36,47] (36,47] (36,47]  
## [1025] (47,90] (47,90] (36,47] (17,27] (36,47] (36,47] (47,90] (17,27]  
## [1033] (36,47] (47,90] (27,36] (36,47] (27,36] (27,36] (27,36] (27,36]  
## [1041] (36,47] (36,47] (17,27] (27,36] (36,47] (36,47] (36,47] (27,36]  
## [1049] (27,36] (27,36] (17,27] (47,90] (17,27] (17,27] (36,47] (36,47]  
## [1057] <NA> (27,36] (17,27] (36,47] (36,47] (47,90] (17,27] <NA>   
## [1065] (36,47] (17,27] (36,47] (47,90] (47,90] (17,27] (36,47] (17,27]  
## [1073] (36,47] (36,47] (17,27] (36,47] (47,90] (36,47] (27,36] (47,90]  
## [1081] (27,36] (27,36] (36,47] (47,90] (47,90] (17,27] (47,90] (36,47]  
## [1089] (27,36] (27,36] (17,27] (47,90] (36,47] (17,27] (27,36] (27,36]  
## [1097] (36,47] (47,90] (36,47] (17,27] (27,36] (36,47] (27,36] (36,47]  
## [1105] (47,90] (47,90] (17,27] (27,36] (36,47] (17,27] (36,47] (17,27]  
## [1113] (17,27] (17,27] (17,27] (27,36] (36,47] (47,90] (36,47] (17,27]  
## [1121] (17,27] (17,27] (47,90] (17,27] (27,36] (36,47] (36,47] (36,47]  
## [1129] (47,90] (47,90] (47,90] (36,47] (36,47] (17,27] (47,90] (36,47]  
## [1137] (47,90] (36,47] (36,47] (47,90] (47,90] (27,36] (47,90] (17,27]  
## [1145] (47,90] (17,27] (17,27] (17,27] (36,47] (27,36] (27,36] (36,47]  
## [1153] (17,27] (17,27] (27,36] (17,27] (27,36] (27,36] (17,27] (36,47]  
## [1161] (47,90] (47,90] (27,36] (47,90] (36,47] (36,47] (17,27] (47,90]  
## [1169] (17,27] (17,27] (36,47] (17,27] (17,27] (17,27] (47,90] (17,27]  
## [1177] (17,27] (36,47] (36,47] (17,27] (36,47] (36,47] (36,47] (36,47]  
## [1185] (36,47] (36,47] (36,47] (17,27] (47,90] (36,47] (17,27] (17,27]  
## [1193] (17,27] (47,90] (27,36] (17,27] (47,90] (47,90] (36,47] (47,90]  
## [1201] (17,27] (27,36] (47,90] (27,36] (27,36] (36,47] (47,90] (27,36]  
## [1209] (36,47] (36,47] (36,47] (36,47] (17,27] (36,47] (47,90] (36,47]  
## [1217] (47,90] (36,47] (17,27] (27,36] (27,36] (27,36] (36,47] (36,47]  
## [1225] (47,90] (47,90] (17,27] (36,47] (27,36] (27,36] (27,36] (36,47]  
## [1233] (47,90] (27,36] (36,47] (47,90] (47,90] (27,36] (47,90] (47,90]  
## [1241] (36,47] (27,36] (27,36] (47,90] (17,27] (27,36] (17,27] (47,90]  
## [1249] (47,90] (36,47] (36,47] (27,36] (17,27] (27,36] (47,90] (36,47]  
## [1257] (36,47] (47,90] (27,36] (27,36] (17,27] (17,27] (47,90] (36,47]  
## [1265] (27,36] (27,36] (47,90] (17,27] (27,36] (36,47] (27,36] (36,47]  
## [1273] (27,36] (36,47] (36,47] (47,90] (47,90] (17,27] (27,36] (27,36]  
## [1281] (17,27] (17,27] (17,27] (17,27] (47,90] (17,27] (47,90] (47,90]  
## [1289] (47,90] (47,90] (27,36] (17,27] (36,47] (27,36] (27,36] (47,90]  
## [1297] (17,27] (27,36] (27,36] (47,90] (27,36] (36,47] (27,36] (36,47]  
## [1305] (36,47] (17,27] (36,47] (36,47] (17,27] (27,36] (17,27] (36,47]  
## [1313] (47,90] (47,90] (36,47] (17,27] (47,90] (27,36] (17,27] (17,27]  
## [1321] (17,27] (27,36] (27,36] (47,90] (36,47] (47,90] (17,27] (27,36]  
## [1329] (27,36] (47,90] (36,47] (17,27] (47,90] (27,36] (17,27] (17,27]  
## [1337] (27,36] (47,90] (17,27] (27,36] (27,36] (47,90] (27,36] (47,90]  
## [1345] (36,47] (17,27] (17,27] (27,36] (27,36] (36,47] (17,27] (27,36]  
## [1353] (17,27] (27,36] (47,90] (36,47] (47,90] (47,90] (27,36] (27,36]  
## [1361] (47,90] (27,36] (47,90] (36,47] (36,47] (47,90] (17,27] (36,47]  
## [1369] (17,27] (36,47] (36,47] (17,27] (47,90] (36,47] (17,27] (47,90]  
## [1377] (17,27] (17,27] (47,90] (36,47] (27,36] (17,27] (17,27] (47,90]  
## [1385] (17,27] (36,47] (36,47] (27,36] (17,27] (17,27] (47,90] (47,90]  
## [1393] (47,90] (47,90] (36,47] (27,36] (27,36] (17,27] (17,27] (36,47]  
## [1401] (17,27] (27,36] (47,90] (27,36] (27,36] (47,90] (47,90] (17,27]  
## [1409] (17,27] (17,27] (17,27] (27,36] (27,36] (36,47] (17,27] (36,47]  
## [1417] (27,36] (27,36] (47,90] (36,47] (47,90] (36,47] (27,36] (17,27]  
## [1425] (17,27] (47,90] (27,36] (27,36] (27,36] (47,90] (17,27] (47,90]  
## [1433] (27,36] (17,27] (36,47] (36,47] (17,27] (27,36] (27,36] (17,27]  
## [1441] (36,47] (17,27] (36,47] (17,27] (36,47] (27,36] (36,47] (27,36]  
## [1449] (36,47] (47,90] (27,36] (47,90] (47,90] (47,90] (36,47] (36,47]  
## [1457] (36,47] (36,47] (17,27] (47,90] (47,90] (17,27] (36,47] (36,47]  
## [1465] (36,47] (27,36] (47,90] (17,27] (36,47] (27,36] (27,36] (36,47]  
## [1473] (36,47] (47,90] (17,27] (36,47] (47,90] (27,36] (47,90] (36,47]  
## [1481] (27,36] (47,90] (36,47] (27,36] (17,27] (27,36] (27,36] (17,27]  
## [1489] (27,36] (17,27] (47,90] (17,27] (27,36] (17,27] (36,47] (36,47]  
## [1497] (36,47] (27,36] (27,36] (36,47] (17,27] (36,47] (47,90] (47,90]  
## [1505] (47,90] (47,90] (47,90] (47,90] (17,27] (47,90] (27,36] (47,90]  
## [1513] (17,27] (17,27] (47,90] (36,47] (47,90] (17,27] (17,27] (27,36]  
## [1521] (27,36] (17,27] (17,27] (27,36] (27,36] (36,47] (36,47] (27,36]  
## [1529] (47,90] (17,27] (17,27] (47,90] (47,90] (47,90] (17,27] (27,36]  
## [1537] (17,27] (47,90] (27,36] (27,36] (27,36] (47,90] (17,27] (47,90]  
## [1545] (17,27] (17,27] (17,27] (27,36] (36,47] (27,36] (47,90] (17,27]  
## [1553] (17,27] (47,90] (17,27] (36,47] (47,90] (17,27] (17,27] (27,36]  
## [1561] (36,47] (27,36] (17,27] (17,27] (47,90] (17,27] (36,47] (17,27]  
## [1569] (17,27] (47,90] (17,27] (47,90] (47,90] (27,36] (27,36] (47,90]  
## [1577] (27,36] (47,90] (36,47] (27,36] (17,27] (17,27] (47,90] (47,90]  
## [1585] (36,47] (47,90] (36,47] <NA> (27,36] (47,90] (47,90] (17,27]  
## [1593] (47,90] (17,27] (27,36] (47,90] (47,90] (36,47] (17,27] (17,27]  
## [1601] (27,36] (36,47] (36,47] (27,36] (47,90] (47,90] (47,90] (17,27]  
## [1609] (27,36] (36,47] (27,36] (36,47] (47,90] (27,36] (36,47] (47,90]  
## [1617] (17,27] (27,36] (36,47] (47,90] (36,47] (27,36] (17,27] (36,47]  
## [1625] (47,90] (47,90] (47,90] (17,27] (36,47] (17,27] (17,27] (27,36]  
## [1633] (17,27] (17,27] (17,27] (27,36] (17,27] (36,47] (27,36] (27,36]  
## [1641] (36,47] (27,36] (27,36] (36,47] (36,47] (17,27] (47,90] (17,27]  
## [1649] (17,27] (27,36] (27,36] (47,90] (36,47] (27,36] (17,27] (36,47]  
## [1657] (47,90] (17,27] (17,27] (36,47] (47,90] (17,27] (17,27] (36,47]  
## [1665] (17,27] (27,36] (27,36] (47,90] (27,36] (47,90] (27,36] (36,47]  
## [1673] (27,36] (47,90] (17,27] (47,90] (27,36] (36,47] (27,36] (27,36]  
## [1681] (17,27] (17,27] (47,90] (47,90] (47,90] (47,90] (36,47] (27,36]  
## [1689] (27,36] (17,27] (47,90] (36,47] (36,47] (47,90] (17,27] (36,47]  
## [1697] (17,27] (36,47] (17,27] (47,90] (27,36] (47,90] (36,47] (36,47]  
## [1705] (17,27] (36,47] (47,90] (36,47] (27,36] (27,36] (17,27] (17,27]  
## [1713] (17,27] (27,36] (36,47] (27,36] (36,47] (47,90] (36,47] (36,47]  
## [1721] (27,36] (47,90] (47,90] (36,47] (47,90] (27,36] (27,36] (36,47]  
## [1729] (36,47] (27,36] (47,90] (17,27] (36,47] (17,27] (27,36] (36,47]  
## [1737] (27,36] (27,36] (47,90] (17,27] (47,90] (17,27] (17,27] (17,27]  
## [1745] (47,90] (36,47] (47,90] (36,47] (36,47] (17,27] (47,90] (17,27]  
## [1753] (27,36] (27,36] (36,47] (47,90] (27,36] <NA> <NA> (27,36]  
## [1761] (47,90] (17,27] (47,90] (17,27] (47,90] (17,27] (17,27] (47,90]  
## [1769] (17,27] (17,27] (36,47] (27,36] (36,47] (36,47] (17,27] (17,27]  
## [1777] (17,27] (36,47] (36,47] (36,47] (27,36] (47,90] (47,90] <NA>   
## [1785] (27,36] (36,47] (36,47] (47,90] (47,90] (27,36] (47,90] (36,47]  
## [1793] (47,90] (36,47] (17,27] (17,27] (36,47] (17,27] <NA> (27,36]  
## [1801] (47,90] (47,90] (27,36] (27,36] (27,36] (47,90] (27,36] (17,27]  
## [1809] (36,47] (47,90] (36,47] (17,27] (36,47] (36,47] (36,47] (47,90]  
## [1817] (36,47] (27,36] (47,90] (17,27] (36,47] (27,36] (27,36] (17,27]  
## [1825] (17,27] (47,90] (36,47] (27,36] (47,90] (17,27] (27,36] (27,36]  
## [1833] (47,90] (17,27] (47,90] (47,90] (27,36] (36,47] (36,47] (36,47]  
## [1841] (17,27] (36,47] (17,27] (36,47] (27,36] (27,36] (47,90] (17,27]  
## [1849] (36,47] (17,27] (47,90] (17,27] (47,90] (47,90] (27,36] (27,36]  
## [1857] (36,47] (47,90] (17,27] (36,47] (17,27] (47,90] (36,47] (36,47]  
## [1865] (36,47] (36,47] (27,36] (47,90] (36,47] (47,90] (27,36] (27,36]  
## [1873] (47,90] (17,27] (17,27] (17,27] (27,36] (36,47] (17,27] (17,27]  
## [1881] (47,90] (36,47] (27,36] (47,90] (27,36] (47,90] (47,90] (36,47]  
## [1889] (47,90] (47,90] (36,47] (36,47] (36,47] (47,90] (17,27] (27,36]  
## [1897] (27,36] (27,36] (47,90] (36,47] (17,27] (47,90] (47,90] <NA>   
## [1905] (27,36] (36,47] (17,27] (36,47] (36,47] (27,36] (36,47] (27,36]  
## [1913] (27,36] <NA> (36,47] (17,27] (17,27] (27,36] (47,90] (17,27]  
## [1921] (17,27] (17,27] (27,36] (47,90] (17,27] (27,36] (47,90] (17,27]  
## [1929] (47,90] (27,36] (27,36] (36,47] (17,27] (17,27] (36,47] (47,90]  
## [1937] (17,27] (27,36] (27,36] (36,47] (47,90] (17,27] (27,36] (47,90]  
## [1945] (17,27] (27,36] (36,47] (17,27] (17,27] (27,36] (27,36] (27,36]  
## [1953] (27,36] (47,90] (47,90] (47,90] (17,27] <NA> (36,47] (27,36]  
## [1961] (36,47] (17,27] (36,47] (17,27] (17,27] (17,27] (36,47] (17,27]  
## [1969] (36,47] (47,90] (47,90] (17,27] (36,47] (36,47] (36,47] (27,36]  
## [1977] (47,90] (36,47] (36,47] (36,47] (17,27] (17,27] (17,27] (27,36]  
## [1985] (27,36] (17,27] (17,27] (47,90] (17,27] (27,36] (27,36] (27,36]  
## [1993] (36,47] (27,36] (27,36] (36,47] (27,36] (36,47] <NA> (36,47]  
## [2001] (17,27] (27,36] (27,36] (17,27] (47,90] (17,27] (17,27] (47,90]  
## [2009] (17,27] (47,90] (17,27] (36,47] (17,27] (27,36] (27,36] (47,90]  
## [2017] (36,47] (47,90] (27,36] (17,27] (47,90] (27,36] (17,27] (17,27]  
## [2025] (17,27] (36,47] (27,36] (36,47] (17,27] (27,36] (36,47] (36,47]  
## [2033] (47,90] <NA> (27,36] (47,90] (27,36] (17,27] (17,27] (47,90]  
## [2041] (36,47] (27,36] <NA> (17,27] (27,36] (36,47] (27,36] (27,36]  
## [2049] (36,47] (36,47] (27,36] (36,47] (47,90] (27,36] (47,90] (17,27]  
## [2057] (27,36] (27,36] (17,27] (17,27] (47,90] (27,36] (36,47] (36,47]  
## [2065] (47,90] (17,27] (27,36] (27,36] (36,47] (17,27] (27,36] (36,47]  
## [2073] (47,90] (17,27] (27,36] (47,90] (36,47] (17,27] (36,47] (17,27]  
## [2081] (27,36] (17,27] (27,36] (17,27] (17,27] (47,90] (27,36] (36,47]  
## [2089] (27,36] (17,27] (27,36] (17,27] (36,47] (36,47] (47,90] (27,36]  
## [2097] (47,90] (17,27] (47,90] (27,36] (17,27] (17,27] (47,90] (27,36]  
## [2105] (17,27] (17,27] (36,47] (36,47] (36,47] (27,36] (27,36] (36,47]  
## [2113] (27,36] (36,47] (27,36] (17,27] (36,47] (47,90] (36,47] (27,36]  
## [2121] (47,90] (47,90] (47,90] (17,27] (17,27] (27,36] (27,36] (36,47]  
## [2129] (27,36] (36,47] (36,47] (47,90] (27,36] (47,90] (36,47] (36,47]  
## [2137] (17,27] (36,47] (17,27] (47,90] (47,90] (36,47] (27,36] (27,36]  
## [2145] (27,36] (27,36] (47,90] (27,36] (17,27] (47,90] (36,47] (47,90]  
## [2153] (47,90] (47,90] (47,90] (36,47] (47,90] (47,90] (47,90] (36,47]  
## [2161] (36,47] (47,90] (27,36] (47,90] (27,36] (17,27] (36,47] (47,90]  
## [2169] (27,36] (36,47] (17,27] (27,36] (27,36] (36,47] (36,47] (17,27]  
## [2177] (47,90] (27,36] (27,36] (27,36] (17,27] (47,90] (27,36] (47,90]  
## [2185] (17,27] (36,47] (36,47] (17,27] (36,47] (27,36] (17,27] (36,47]  
## [2193] (27,36] (36,47] (27,36] (47,90] (47,90] (47,90] (36,47] (27,36]  
## [2201] (17,27] (47,90] (17,27] (36,47] (27,36] (17,27] (47,90] (17,27]  
## [2209] (27,36] (27,36] (36,47] (47,90] (36,47] (36,47] (47,90] (36,47]  
## [2217] (27,36] (17,27] (47,90] (47,90] (27,36] (27,36] (17,27] (36,47]  
## [2225] (47,90] (47,90] (36,47] (17,27] (47,90] (36,47] (47,90] (17,27]  
## [2233] (36,47] (17,27] (17,27] (27,36] (17,27] (47,90] (36,47] (17,27]  
## [2241] (47,90] (27,36] (27,36] <NA> (17,27] (17,27] (27,36] (47,90]  
## [2249] <NA> (17,27] (17,27] (17,27] (36,47] (17,27] (27,36] (17,27]  
## [2257] (47,90] (47,90] (36,47] (27,36] (27,36] (36,47] (36,47] (17,27]  
## [2265] (17,27] (36,47] (27,36] (17,27] (17,27] (27,36] (36,47] (36,47]  
## [2273] (17,27] (47,90] (17,27] (36,47] (47,90] (27,36] (17,27] (27,36]  
## [2281] (27,36] (36,47] (27,36] (47,90] (17,27] (17,27] (36,47] (36,47]  
## [2289] (47,90] (47,90] (47,90] (47,90] (47,90] (36,47] (36,47] (27,36]  
## [2297] (47,90] (36,47] (47,90] (17,27] (27,36] (27,36] (47,90] (47,90]  
## [2305] (27,36] (47,90] (36,47] (27,36] (36,47] (27,36] (36,47] (27,36]  
## [2313] (27,36] (17,27] (36,47] (47,90] (17,27] (17,27] (36,47] (47,90]  
## [2321] (36,47] (36,47] (27,36] (17,27] (47,90] (47,90] (36,47] (27,36]  
## [2329] (27,36] (47,90] (36,47] (17,27] (36,47] (47,90] (17,27] (27,36]  
## [2337] (47,90] (47,90] (47,90] (27,36] (27,36] (17,27] (17,27] (47,90]  
## [2345] (36,47] (47,90] (17,27] (27,36] (27,36] (36,47] (47,90] (17,27]  
## [2353] (17,27] (17,27] (17,27] (47,90] (36,47] (47,90] (27,36] (47,90]  
## [2361] (47,90] (27,36] (47,90] (27,36] (47,90] (17,27] (47,90] (17,27]  
## [2369] (47,90] (36,47] (36,47] (47,90] (47,90] (36,47] (17,27] (17,27]  
## [2377] (36,47] (36,47] (27,36] (27,36] (47,90] (27,36] (17,27] (17,27]  
## [2385] (47,90] (47,90] (47,90] (27,36] (47,90] (36,47] (27,36] (36,47]  
## [2393] (47,90] (27,36] (27,36] (36,47] (17,27] (36,47] (36,47] (47,90]  
## [2401] (27,36] (47,90] (27,36] (36,47] (27,36] (47,90] (27,36] (36,47]  
## [2409] (47,90] (36,47] (27,36] (27,36] (47,90] (47,90] (47,90] (36,47]  
## [2417] (36,47] (47,90] (27,36] (17,27] (47,90] (47,90] (27,36] (36,47]  
## [2425] (27,36] (36,47] (17,27] (17,27] (47,90] (36,47] (17,27] (27,36]  
## [2433] (27,36] (36,47] (27,36] (36,47] (36,47] (27,36] (47,90] (27,36]  
## [2441] (36,47] (47,90] (17,27] (17,27] (36,47] (36,47] (47,90] (17,27]  
## [2449] (36,47] (36,47] (36,47] (17,27] (27,36] (17,27] (47,90] (36,47]  
## [2457] <NA> (17,27] (47,90] (17,27] (17,27] (47,90] (27,36] (36,47]  
## [2465] (36,47] (47,90] (17,27] (17,27] (17,27] (47,90] (47,90] (27,36]  
## [2473] (17,27] (36,47] (27,36] (27,36] (17,27] (27,36] (36,47] (27,36]  
## [2481] (36,47] (17,27] (17,27] (47,90] (27,36] (27,36] (47,90] (36,47]  
## [2489] (17,27] (27,36] (17,27] (17,27] (27,36] (47,90] (47,90] (27,36]  
## [2497] (36,47] (36,47] (17,27] (17,27] (47,90] (47,90] (27,36] (47,90]  
## [2505] (47,90] (36,47] (47,90] (17,27] (17,27] (17,27] (17,27] (47,90]  
## [2513] (27,36] (47,90] (36,47] (47,90] (27,36] (17,27] (36,47] (27,36]  
## [2521] (47,90] (36,47] (36,47] (27,36] (17,27] (36,47] (17,27] (27,36]  
## [2529] (27,36] (17,27] (47,90] (47,90] (36,47] (36,47] (47,90] (36,47]  
## [2537] (36,47] (47,90] (27,36] (47,90] (47,90] (17,27] (47,90] (47,90]  
## [2545] (17,27] (17,27] (36,47] (47,90] (47,90] (47,90] (47,90] (17,27]  
## [2553] (47,90] (47,90] (17,27] (27,36] (27,36] (27,36] (36,47] (27,36]  
## [2561] (27,36] (47,90] (27,36] (17,27] (27,36] (47,90] (17,27] (47,90]  
## [2569] (36,47] (17,27] (17,27] (47,90] (27,36] (47,90] (27,36] (27,36]  
## [2577] (27,36] (27,36] (47,90] (17,27] (27,36] (47,90] (27,36] (17,27]  
## [2585] (27,36] (27,36] (36,47] (17,27] (47,90] (17,27] (36,47] (47,90]  
## [2593] (17,27] (27,36] (17,27] (17,27] (27,36] (27,36] (17,27] (27,36]  
## [2601] (47,90] (17,27] (17,27] (27,36] (47,90] (36,47] (47,90] (27,36]  
## [2609] (27,36] (17,27] (17,27] <NA> (47,90] (36,47] (17,27] (17,27]  
## [2617] (47,90] (47,90] (17,27] (47,90] (17,27] (17,27] (27,36] (17,27]  
## [2625] (27,36] (27,36] (36,47] (36,47] (36,47] (27,36] (47,90] (17,27]  
## [2633] (27,36] (27,36] (47,90] (27,36] (36,47] (17,27] (17,27] (17,27]  
## [2641] (17,27] (17,27] (27,36] (27,36] (17,27] (27,36] <NA> (17,27]  
## [2649] (36,47] (27,36] (17,27] (36,47] (27,36] (47,90] (36,47] (47,90]  
## [2657] (17,27] (36,47] (36,47] (27,36] (36,47] (47,90] (17,27] (36,47]  
## [2665] (47,90] (36,47] (27,36] (17,27] (47,90] (47,90] (17,27] (17,27]  
## [2673] (36,47] (17,27] (27,36] (47,90] (27,36] (17,27] (17,27] (36,47]  
## [2681] (17,27] (47,90] (47,90] (17,27] (36,47] (27,36] (36,47] (36,47]  
## [2689] (36,47] (36,47] (36,47] (27,36] (27,36] (36,47] (27,36] (47,90]  
## [2697] (36,47] (36,47] (47,90] (36,47] (27,36] (27,36] (36,47] (47,90]  
## [2705] (17,27] (17,27] (27,36] (17,27] (36,47] (47,90] (36,47] (27,36]  
## [2713] (47,90] (27,36] (17,27] (36,47] (17,27] (47,90] (47,90] (36,47]  
## [2721] (36,47] (47,90] (17,27] (36,47] (47,90] (17,27] (27,36] (47,90]  
## [2729] (47,90] (17,27] (17,27] (27,36] (36,47] (47,90] (47,90] (27,36]  
## [2737] (27,36] (36,47] (36,47] (27,36] (27,36] (17,27] (47,90] (47,90]  
## [2745] (27,36] (47,90] (36,47] (36,47] (36,47] (27,36] (47,90] (36,47]  
## [2753] (27,36] (27,36] (17,27] (36,47] (47,90] (17,27] (47,90] (17,27]  
## [2761] (27,36] (47,90] (27,36] (47,90] (17,27] (47,90] (17,27] (17,27]  
## [2769] (47,90] (17,27] (27,36] (36,47] (17,27] (17,27] (47,90] (47,90]  
## [2777] (27,36] (17,27] (17,27] (27,36] (36,47] (36,47] <NA> (36,47]  
## [2785] (47,90] (36,47] (36,47] (36,47] (17,27] (36,47] (36,47] (27,36]  
## [2793] (17,27] (36,47] (27,36] (47,90] (27,36] (27,36] (36,47] (36,47]  
## [2801] (27,36] (36,47] (47,90] (27,36] (27,36] (17,27] (47,90] (27,36]  
## [2809] (17,27] (27,36] (27,36] (47,90] (27,36] (47,90] (47,90] (47,90]  
## [2817] (36,47] (27,36] (47,90] (36,47] (36,47] (27,36] (27,36] (17,27]  
## [2825] (36,47] (17,27] (17,27] (47,90] (36,47] (17,27] (36,47] (47,90]  
## [2833] (36,47] (27,36] (47,90] (17,27] (36,47] (17,27] (36,47] (47,90]  
## [2841] (27,36] (47,90] (36,47] (47,90] (36,47] (27,36] (27,36] (17,27]  
## [2849] (27,36] (27,36] (36,47] (27,36] (17,27] (47,90] (47,90] (27,36]  
## [2857] (17,27] (47,90] (47,90] (47,90] (36,47] (47,90] (17,27] (47,90]  
## [2865] (47,90] (36,47] (47,90] (27,36] (36,47] (47,90] (17,27] (47,90]  
## [2873] (17,27] (17,27] (36,47] (47,90] (36,47] (17,27] (27,36] (47,90]  
## [2881] (17,27] (47,90] (17,27] (36,47] (47,90] (27,36] (27,36] (47,90]  
## [2889] (27,36] (36,47] (27,36] (17,27] (17,27] (36,47] (27,36] (27,36]  
## [2897] (17,27] (36,47] (47,90] (36,47] (36,47] (17,27] (47,90] (27,36]  
## [2905] (27,36] (27,36] (47,90] (27,36] (47,90] (36,47] (36,47] (36,47]  
## [2913] (17,27] (47,90] (36,47] (27,36] (47,90] (36,47] (27,36] (27,36]  
## [2921] (36,47] (27,36] (36,47] (27,36] (17,27] (47,90] (17,27] (47,90]  
## [2929] (47,90] (36,47] (47,90] (27,36] (17,27] (36,47] (17,27] (27,36]  
## [2937] (36,47] (27,36] (36,47] (27,36] (17,27] (17,27] (47,90] (47,90]  
## [2945] (36,47] (17,27] (47,90] (47,90] (17,27] (36,47] (47,90] (27,36]  
## [2953] (36,47] (36,47] (27,36] (27,36] (27,36] (47,90] (27,36] (47,90]  
## [2961] (47,90] (17,27] (17,27] (17,27] (47,90] (27,36] (17,27] (27,36]  
## [2969] (27,36] (17,27] (17,27] (17,27] (27,36] (27,36] (27,36] (36,47]  
## [2977] (27,36] (36,47] (36,47] (36,47] <NA> (17,27] (27,36] (27,36]  
## [2985] (17,27] (47,90] (27,36] (17,27] (27,36] (47,90] (27,36] (36,47]  
## [2993] (36,47] (27,36] (17,27] (17,27] (27,36] (17,27] (27,36] (17,27]  
## [3001] (36,47] (27,36] (17,27] (36,47] (47,90] (17,27] (36,47] (47,90]  
## [3009] (17,27] (17,27] (27,36] (36,47] (36,47] (47,90] (17,27] (17,27]  
## [3017] (36,47] (27,36] (27,36] (47,90] (27,36] (36,47] (47,90] (36,47]  
## [3025] (47,90] (36,47] (36,47] (17,27] (17,27] (47,90] (47,90] (17,27]  
## [3033] (36,47] (27,36] (47,90] (36,47] (47,90] (36,47] (27,36] (47,90]  
## [3041] (27,36] (17,27] (27,36] (27,36] (47,90] (36,47] (47,90] (47,90]  
## [3049] (17,27] (36,47] (17,27] (17,27] (17,27] (47,90] (27,36] (27,36]  
## [3057] (17,27] (17,27] (47,90] (27,36] (36,47] (27,36] (36,47] (47,90]  
## [3065] (17,27] (17,27] (36,47] (47,90] (47,90] (36,47] (17,27] (17,27]  
## [3073] (27,36] (36,47] (17,27] (36,47] (27,36] (36,47] (17,27] (17,27]  
## [3081] (27,36] (27,36] (17,27] (27,36] (27,36] (17,27] (47,90] (27,36]  
## [3089] (27,36] (17,27] (17,27] (27,36] (27,36] (47,90] (47,90] (47,90]  
## [3097] (36,47] (36,47] (47,90] (17,27] (36,47] (36,47] (27,36] (47,90]  
## [3105] (36,47] (27,36] (36,47] (36,47] (47,90] (27,36] (17,27] (17,27]  
## [3113] (27,36] (47,90] (47,90] (17,27] (47,90] (36,47] (36,47] (36,47]  
## [3121] (47,90] (36,47] (17,27] <NA> (17,27] (17,27] (47,90] (36,47]  
## [3129] (47,90] (27,36] (36,47] <NA> (47,90] (36,47] (27,36] (36,47]  
## [3137] (17,27] (17,27] (36,47] (17,27] (17,27] (36,47] (17,27] (36,47]  
## [3145] (17,27] (17,27] (36,47] (36,47] (27,36] (36,47] (47,90] (17,27]  
## [3153] (27,36] (36,47] (47,90] (47,90] (47,90] (47,90] (47,90] (47,90]  
## [3161] (36,47] (36,47] (36,47] (27,36] (27,36] (47,90] (47,90] (36,47]  
## [3169] (27,36] (36,47] (27,36] (36,47] (47,90] (27,36] (17,27] (36,47]  
## [3177] (47,90] (17,27] (17,27] (27,36] (17,27] (36,47] (27,36] (17,27]  
## [3185] (27,36] (47,90] (47,90] (36,47] (36,47] (17,27] (36,47] (36,47]  
## [3193] (36,47] (36,47] (36,47] (36,47] (47,90] (27,36] (47,90] (36,47]  
## [3201] (27,36] (47,90] (17,27] (47,90] (36,47] (17,27] (36,47] (27,36]  
## [3209] (47,90] (36,47] (36,47] (17,27] (27,36] (17,27] (36,47] (17,27]  
## [3217] (36,47] (27,36] (47,90] (47,90] (27,36] (47,90] (47,90] (47,90]  
## [3225] (36,47] (47,90] (36,47] (36,47] (36,47] (47,90] (36,47] (17,27]  
## [3233] (17,27] (36,47] (17,27] (17,27] (27,36] (36,47] (47,90] (17,27]  
## [3241] (17,27] (27,36] (36,47] (17,27] (17,27] (17,27] (17,27] (47,90]  
## [3249] (27,36] (27,36] (47,90] (36,47] (17,27] (47,90] (17,27] (47,90]  
## [3257] (36,47] (36,47] (27,36] (17,27] (47,90] (47,90] (47,90] (36,47]  
## [3265] (17,27] (36,47] (27,36] (36,47] (36,47] (36,47] (36,47] (27,36]  
## [3273] (47,90] (47,90] (27,36] (47,90] (47,90] (27,36] (27,36] (27,36]  
## [3281] (47,90] (36,47] (27,36] (36,47] (27,36] (27,36] (36,47] (17,27]  
## [3289] (36,47] (27,36] (47,90] (17,27] (17,27] (17,27] (17,27] (17,27]  
## [3297] (17,27] (27,36] (17,27] (27,36] (47,90] (27,36] (36,47] (27,36]  
## [3305] (36,47] (17,27] (47,90] (47,90] (47,90] (47,90] (47,90] (17,27]  
## [3313] (27,36] (36,47] (36,47] (36,47] (17,27] (47,90] (47,90] (36,47]  
## [3321] (47,90] (27,36] (17,27] (47,90] (36,47] (17,27] (17,27] (27,36]  
## [3329] (27,36] (47,90] (36,47] (17,27] (17,27] (17,27] (17,27] (47,90]  
## [3337] (27,36] (36,47] (17,27] (36,47] (27,36] (47,90] (47,90] (47,90]  
## [3345] (27,36] (47,90] (27,36] (47,90] (27,36] (17,27] (27,36] (47,90]  
## [3353] (27,36] (17,27] (27,36] (36,47] (17,27] (17,27] (47,90] (17,27]  
## [3361] (27,36] (17,27] (36,47] <NA> (17,27] (36,47] (47,90] (17,27]  
## [3369] (17,27] (47,90] (27,36] (47,90] (27,36] (36,47] (17,27] (17,27]  
## [3377] (17,27] (36,47] (47,90] (17,27] (27,36] (47,90] (27,36] (47,90]  
## [3385] (47,90] (27,36] (36,47] (27,36] (27,36] (17,27] (27,36] (27,36]  
## [3393] (27,36] (47,90] (27,36] (47,90] (17,27] (27,36] (17,27] (17,27]  
## [3401] (27,36] (36,47] (17,27] (36,47] (47,90] (36,47] (27,36] (17,27]  
## [3409] (27,36] (36,47] (27,36] (27,36] (36,47] (27,36] (17,27] (36,47]  
## [3417] (27,36] (47,90] (36,47] (17,27] <NA> (36,47] (47,90] (27,36]  
## [3425] (17,27] (36,47] (36,47] (17,27] (36,47] (27,36] (17,27] (17,27]  
## [3433] (17,27] (27,36] (27,36] (36,47] (36,47] (36,47] (17,27] (47,90]  
## [3441] (36,47] (27,36] (47,90] (27,36] (17,27] (36,47] (17,27] (47,90]  
## [3449] (36,47] (36,47] (36,47] (47,90] (36,47] (27,36] (17,27] (36,47]  
## [3457] (47,90] (27,36] <NA> (27,36] (36,47] (36,47] (17,27] (36,47]  
## [3465] (47,90] (36,47] (17,27] (36,47] (47,90] (47,90] (47,90] (36,47]  
## [3473] (36,47] (47,90] (47,90] (27,36] (47,90] (36,47] (36,47] (36,47]  
## [3481] (36,47] (47,90] (36,47] (17,27] (36,47] (47,90] (17,27] (36,47]  
## [3489] (47,90] (36,47] (27,36] (27,36] (36,47] (17,27] (27,36] (27,36]  
## [3497] (17,27] (27,36] (17,27] (47,90] (27,36] (36,47] (47,90] (17,27]  
## [3505] (36,47] (47,90] (27,36] (27,36] (27,36] (27,36] (17,27] (27,36]  
## [3513] (36,47] (17,27] (27,36] (36,47] (47,90] (17,27] (36,47] (27,36]  
## [3521] (17,27] (27,36] (17,27] (17,27] (17,27] (36,47] (36,47] (36,47]  
## [3529] (36,47] (27,36] (17,27] (47,90] (17,27] (36,47] (27,36] (17,27]  
## [3537] (36,47] (17,27] (36,47] (47,90] (36,47] (47,90] (47,90] (27,36]  
## [3545] <NA> (17,27] (17,27] (36,47] (47,90] (27,36] (27,36] (36,47]  
## [3553] (36,47] (47,90] (27,36] (36,47] (27,36] (17,27] (47,90] (27,36]  
## [3561] (36,47] (27,36] (36,47] (17,27] (17,27] (47,90] (36,47] (47,90]  
## [3569] (36,47] (17,27] (36,47] (36,47] (17,27] (36,47] (36,47] (17,27]  
## [3577] (36,47] (17,27] (17,27] (27,36] (47,90] (36,47] (17,27] (17,27]  
## [3585] (47,90] (36,47] (36,47] (27,36] (17,27] (36,47] (36,47] (47,90]  
## [3593] (36,47] (17,27] (47,90] (17,27] (17,27] (36,47] (17,27] (17,27]  
## [3601] (17,27] (47,90] (27,36] (17,27] (36,47] (17,27] (47,90] (17,27]  
## [3609] (36,47] (17,27] (17,27] (27,36] (36,47] (47,90] (47,90] (27,36]  
## [3617] (36,47] (17,27] (36,47] (17,27] (47,90] (47,90] (17,27] (47,90]  
## [3625] (36,47] (36,47] (27,36] (47,90] (47,90] (27,36] (47,90] (17,27]  
## [3633] (36,47] (47,90] (36,47] (17,27] (27,36] (17,27] (36,47] (17,27]  
## [3641] (47,90] (47,90] (27,36] (17,27] (47,90] (36,47] (17,27] (36,47]  
## [3649] (17,27] (27,36] (36,47] (27,36] (36,47] (47,90] (17,27] (36,47]  
## [3657] (47,90] (47,90] (27,36] (47,90] (17,27] (47,90] (17,27] (36,47]  
## [3665] (36,47] (47,90] (36,47] (36,47] (47,90] (27,36] (36,47] (17,27]  
## [3673] (47,90] (47,90] (36,47] (27,36] (27,36] (17,27] (47,90] (36,47]  
## [3681] (36,47] (17,27] (36,47] (36,47] (17,27] (36,47] (17,27] (47,90]  
## [3689] (27,36] (17,27] (47,90] (27,36] (47,90] (47,90] (36,47] (27,36]  
## [3697] (27,36] (47,90] (47,90] (36,47] (17,27] (27,36] (47,90] (17,27]  
## [3705] (36,47] (36,47] (36,47] (47,90] (47,90] (36,47] (27,36] (47,90]  
## [3713] (27,36] (36,47] (17,27] (27,36] (47,90] (27,36] (27,36] (47,90]  
## [3721] (47,90] (17,27] (36,47] (17,27] (36,47] (47,90] (47,90] (36,47]  
## [3729] (36,47] (17,27] (27,36] (36,47] (47,90] (27,36] (17,27] (17,27]  
## [3737] (47,90] (47,90] (47,90] (27,36] (17,27] (47,90] (17,27] (36,47]  
## [3745] (17,27] (47,90] (17,27] (17,27] (27,36] (47,90] (27,36] (27,36]  
## [3753] (27,36] (47,90] (47,90] (27,36] (36,47] (47,90] (47,90] (27,36]  
## [3761] (17,27] (17,27] (36,47] (36,47] (47,90] <NA> (47,90] (17,27]  
## [3769] (47,90] (47,90] (47,90] (17,27] (47,90] (17,27] (47,90] (47,90]  
## [3777] (47,90] (47,90] (36,47] (17,27] (36,47] (47,90] (47,90] (27,36]  
## [3785] (47,90] (36,47] (27,36] (17,27] (27,36] (27,36] (47,90] (27,36]  
## [3793] (27,36] (36,47] (27,36] (47,90] (17,27] (27,36] (27,36] (47,90]  
## [3801] (17,27] (27,36] (27,36] (27,36] (17,27] (27,36] (47,90] (17,27]  
## [3809] <NA> (27,36] (47,90] (36,47] (17,27] (27,36] (36,47] <NA>   
## [3817] (47,90] (47,90] (27,36] (27,36] (36,47] (36,47] (27,36] (17,27]  
## [3825] (17,27] (36,47] (17,27] (17,27] (36,47] (27,36] (17,27] (27,36]  
## [3833] (27,36] (47,90] (36,47] (47,90] (36,47] (47,90] (47,90] (36,47]  
## [3841] (27,36] (17,27] (47,90] (27,36] (47,90] (36,47] (36,47] (17,27]  
## [3849] (47,90] (47,90] (36,47] (36,47] (27,36] (27,36] (47,90] (17,27]  
## [3857] (36,47] (36,47] (27,36] (17,27] (36,47] (47,90] <NA> (47,90]  
## [3865] (27,36] (36,47] (17,27] (27,36] (27,36] (36,47] (27,36] (27,36]  
## [3873] (36,47] (47,90] (27,36] (17,27] (47,90] (27,36] (27,36] (27,36]  
## [3881] (27,36] (47,90] (36,47] (36,47] (36,47] (17,27] (36,47] (27,36]  
## [3889] (17,27] (17,27] (36,47] (27,36] (47,90] (17,27] (36,47] (36,47]  
## [3897] (27,36] (36,47] (17,27] (17,27] (47,90] (36,47] (47,90] (17,27]  
## [3905] (27,36] (47,90] (27,36] <NA> (27,36] (47,90] (27,36] (17,27]  
## [3913] (27,36] (47,90] (17,27] (36,47] (47,90] (27,36] (47,90] (47,90]  
## [3921] (27,36] (47,90] (36,47] (36,47] (36,47] (47,90] (27,36] (47,90]  
## [3929] (36,47] (36,47] (17,27] (47,90] (27,36] (27,36] (36,47] (36,47]  
## [3937] (47,90] (17,27] (47,90] (47,90] (17,27] (36,47] (36,47] (36,47]  
## [3945] (36,47] (47,90] (36,47] (17,27] (47,90] (27,36] (47,90] (36,47]  
## [3953] (36,47] (47,90] (27,36] (36,47] (27,36] (47,90] (36,47] (36,47]  
## [3961] (17,27] (17,27] (17,27] (27,36] (27,36] (17,27] (27,36] (17,27]  
## [3969] (17,27] (17,27] (47,90] (36,47] (47,90] (27,36] (17,27] (27,36]  
## [3977] (17,27] <NA> (47,90] (17,27] (17,27] (47,90] (36,47] (27,36]  
## [3985] (17,27] (17,27] (17,27] (47,90] (47,90] (47,90] (36,47] (36,47]  
## [3993] (17,27] (27,36] (47,90] (27,36] (36,47] (36,47] (47,90] (47,90]  
## [4001] (47,90] (47,90] (17,27] (27,36] (47,90] (27,36] (36,47] (36,47]  
## [4009] (17,27] (27,36] (27,36] (47,90] (36,47] (47,90] (47,90] (27,36]  
## [4017] (36,47] (36,47] (36,47] (47,90] (17,27] (27,36] (47,90] <NA>   
## [4025] (36,47] (17,27] (27,36] (47,90] (36,47] (27,36] (36,47] (47,90]  
## [4033] (27,36] (17,27] (36,47] (47,90] (17,27] (27,36] (47,90] (36,47]  
## [4041] <NA> (47,90] (27,36] (36,47] (36,47] (17,27] (47,90] (47,90]  
## [4049] (47,90] (36,47] (27,36] (47,90] (36,47] (17,27] (47,90] (17,27]  
## [4057] (17,27] (36,47] (17,27] (36,47] (27,36] (17,27] (17,27] (47,90]  
## [4065] (27,36] (47,90] (27,36] (27,36] (36,47] (36,47] (17,27] (47,90]  
## [4073] (17,27] (17,27] (36,47] (36,47] (27,36] (47,90] (36,47] (36,47]  
## [4081] (17,27] (17,27] (36,47] (47,90] (17,27] (17,27] (17,27] (17,27]  
## [4089] (36,47] (27,36] (17,27] (17,27] (47,90] (36,47] (36,47] (47,90]  
## [4097] (27,36] (47,90] (27,36] (27,36] (36,47] (36,47] (47,90] (36,47]  
## [4105] (36,47] (17,27] (17,27] (27,36] (27,36] (27,36] (27,36] (27,36]  
## [4113] (17,27] (17,27] (27,36] (47,90] (27,36] (17,27] (47,90] (17,27]  
## [4121] (17,27] (17,27] (36,47] (17,27] (27,36] (36,47] (27,36] (17,27]  
## [4129] (17,27] (36,47] (47,90] (36,47] (17,27] (17,27] (47,90] (17,27]  
## [4137] (27,36] (17,27] (36,47] (17,27] (27,36] (47,90] (27,36] (36,47]  
## [4145] (36,47] (47,90] (27,36] (36,47] (36,47] (17,27] (17,27] (36,47]  
## [4153] (17,27] (36,47] (17,27] (17,27] (47,90] (17,27] (36,47] (47,90]  
## [4161] (47,90] (27,36] (17,27] (36,47] (27,36] (47,90] (36,47] (27,36]  
## [4169] (36,47] (17,27] (36,47] (27,36] (17,27] (47,90] (27,36] (27,36]  
## [4177] (47,90] (17,27] (36,47] (47,90] (36,47] (27,36] (47,90] (47,90]  
## [4185] (36,47] <NA> (47,90] (27,36] (47,90] (17,27] (17,27] (17,27]  
## [4193] (47,90] (27,36] (47,90] (27,36] (47,90] (36,47] (36,47] (27,36]  
## [4201] (47,90] (17,27] (17,27] (17,27] <NA> (17,27] (47,90] (17,27]  
## [4209] (27,36] (36,47] (27,36] (36,47] (36,47] (17,27] (36,47] (17,27]  
## [4217] (47,90] (17,27] (27,36] (47,90] (27,36] (36,47] (17,27] (17,27]  
## [4225] (47,90] (36,47] (27,36] (27,36] (17,27] (27,36] (47,90] (17,27]  
## [4233] (47,90] (17,27] (47,90] (27,36] (36,47] (47,90] (36,47] (27,36]  
## [4241] (17,27] (27,36] (27,36] (36,47] (47,90] (47,90] (17,27] (47,90]  
## [4249] (27,36] (17,27] (47,90] (17,27] (36,47] (17,27] (27,36] (36,47]  
## [4257] (17,27] (17,27] (27,36] (27,36] (17,27] (17,27] (17,27] (27,36]  
## [4265] (47,90] (47,90] (17,27] (36,47] (36,47] (17,27] (36,47] (36,47]  
## [4273] (17,27] (36,47] (27,36] (17,27] (47,90] <NA> (47,90] (36,47]  
## [4281] (36,47] (36,47] (27,36] (17,27] (36,47] (27,36] (36,47] (36,47]  
## [4289] (27,36] (17,27] (36,47] (36,47] (17,27] (36,47] (36,47] (17,27]  
## [4297] (47,90] (27,36] (27,36] (47,90] (36,47] (36,47] (47,90] (27,36]  
## [4305] (17,27] (27,36] (36,47] (47,90] (27,36] (17,27] (27,36] (36,47]  
## [4313] (36,47] (17,27] (47,90] (47,90] (47,90] (17,27] (47,90] (17,27]  
## [4321] (47,90] (17,27] (27,36] (36,47] (36,47] (17,27] (27,36] (47,90]  
## [4329] (27,36] (36,47] (36,47] (17,27] (17,27] (27,36] (17,27] (47,90]  
## [4337] (36,47] (27,36] (17,27] (17,27] (17,27] (36,47] (27,36] (17,27]  
## [4345] (47,90] (47,90] (17,27] (17,27] (27,36] (36,47] (17,27] (27,36]  
## [4353] (47,90] (17,27] (36,47] (47,90] (47,90] (17,27] (17,27] (36,47]  
## [4361] (27,36] (27,36] (47,90] (47,90] (47,90] (27,36] (36,47] (27,36]  
## [4369] (27,36] (47,90] (36,47] (36,47] (47,90] (47,90] (36,47] (17,27]  
## [4377] (17,27] (27,36] (47,90] (27,36] (27,36] (36,47] (36,47] (36,47]  
## [4385] (17,27] (17,27] (27,36] (17,27] (27,36] (17,27] (36,47] (47,90]  
## [4393] (27,36] (36,47] (47,90] (47,90] (36,47] (36,47] (47,90] (36,47]  
## [4401] <NA> (17,27] (36,47] (36,47] (17,27] (17,27] (47,90] (47,90]  
## [4409] (17,27] (36,47] (17,27] (47,90] (17,27] (27,36] (17,27] (27,36]  
## [4417] (27,36] (47,90] (17,27] (36,47] (17,27] (27,36] (47,90] (47,90]  
## [4425] (17,27] (36,47] (47,90] (47,90] (36,47] (47,90] (47,90] (36,47]  
## [4433] (17,27] (47,90] (36,47] (36,47] (17,27] (47,90] (27,36] (27,36]  
## [4441] (36,47] (27,36] (36,47] (27,36] (17,27] (47,90] (36,47] (27,36]  
## [4449] (17,27] (27,36] (27,36] (36,47] (47,90] (47,90] (47,90] (17,27]  
## [4457] (36,47] (47,90] (27,36] (47,90] (27,36] (27,36] (36,47] (36,47]  
## [4465] (36,47] (17,27] (36,47] (27,36] (47,90] (17,27] (27,36] (27,36]  
## [4473] (27,36] (36,47] (47,90] (27,36] (47,90] (27,36] (36,47] (17,27]  
## [4481] (17,27] (27,36] (27,36] (47,90] (47,90] (27,36] (17,27] (36,47]  
## [4489] (36,47] (47,90] (47,90] (17,27] (36,47] (27,36] (36,47] (17,27]  
## [4497] (36,47] (27,36] (17,27] (47,90] (36,47] (17,27] (17,27] (17,27]  
## [4505] (36,47] (27,36] (47,90] (47,90] (27,36] (47,90] (17,27] (27,36]  
## [4513] (27,36] (47,90] (36,47] (47,90] (36,47] (17,27] (17,27] (17,27]  
## [4521] (27,36] (17,27] (47,90] (36,47] (47,90] (17,27] (27,36] (27,36]  
## [4529] (17,27] (17,27] (17,27] (17,27] (36,47] (36,47] (17,27] (36,47]  
## [4537] (17,27] (27,36] (27,36] (27,36] (36,47] (27,36] (27,36] (27,36]  
## [4545] (27,36] (27,36] (27,36] (36,47] (17,27] (36,47] (17,27] (47,90]  
## [4553] (47,90] (47,90] (17,27] (36,47] (17,27] (36,47] (17,27] (36,47]  
## [4561] (47,90] (17,27] (27,36] (27,36] (27,36] (27,36] (17,27] <NA>   
## [4569] (36,47] (27,36] (27,36] (36,47] (47,90] (27,36] (36,47] (36,47]  
## [4577] (17,27] (47,90] (47,90] (47,90] (47,90] (36,47] (47,90] <NA>   
## [4585] (36,47] (36,47] (17,27] (47,90] (17,27] (27,36] (47,90] (47,90]  
## [4593] (47,90] (47,90] (36,47] (36,47] (36,47] (36,47] (47,90] (36,47]  
## [4601] (27,36] (17,27] (36,47] (27,36] (27,36] (36,47] (27,36] <NA>   
## [4609] (47,90] (47,90] (47,90] (47,90] (36,47] (47,90] (36,47] (36,47]  
## [4617] (36,47] (17,27] (17,27] (27,36] (27,36] (27,36] (17,27] (27,36]  
## [4625] (17,27] (27,36] (47,90] (17,27] (36,47] (36,47] (36,47] (47,90]  
## [4633] (27,36] (36,47] (17,27] (17,27] (47,90] (27,36] (17,27] (17,27]  
## [4641] (36,47] (36,47] (36,47] (17,27] (27,36] (47,90] (36,47] (17,27]  
## [4649] (27,36] (47,90] (27,36] (47,90] (27,36] (17,27] (36,47] (17,27]  
## [4657] (27,36] (17,27] (17,27] (27,36] (47,90] (17,27] (47,90] (27,36]  
## [4665] (47,90] (27,36] (47,90] (27,36] (47,90] (36,47] (17,27] (27,36]  
## [4673] (17,27] (27,36] (47,90] (47,90] (36,47] (47,90] <NA> (27,36]  
## [4681] (36,47] (27,36] <NA> (17,27] (17,27] (36,47] (36,47] (27,36]  
## [4689] (36,47] (36,47] (27,36] (36,47] (17,27] (36,47] (36,47] (27,36]  
## [4697] (27,36] (17,27] (17,27] (27,36] (36,47] (17,27] (47,90] (36,47]  
## [4705] (17,27] (47,90] (27,36] (27,36] (36,47] (17,27] (47,90] (27,36]  
## [4713] (17,27] (27,36] (17,27] (17,27] (47,90] (36,47] (36,47] (47,90]  
## [4721] (36,47] (17,27] (36,47] (36,47] (17,27] (27,36] (27,36] (17,27]  
## [4729] (27,36] (36,47] (27,36] (36,47] (17,27] (27,36] (47,90] (47,90]  
## [4737] (27,36] (47,90] (27,36] (17,27] (36,47] (36,47] (36,47] (27,36]  
## [4745] (47,90] (47,90] (17,27] (27,36] (17,27] (17,27] (47,90] (47,90]  
## [4753] (47,90] (17,27] (36,47] (36,47] (36,47] (47,90] (36,47] (36,47]  
## [4761] (47,90] (17,27] (27,36] (27,36] (17,27] (27,36] (27,36] (27,36]  
## [4769] (27,36] (27,36] (36,47] (47,90] (47,90] (17,27] (47,90] (47,90]  
## [4777] (36,47] (17,27] (17,27] (17,27] (27,36] (36,47] (47,90] (47,90]  
## [4785] (17,27] (36,47] (27,36] (36,47] (47,90] (36,47] (17,27] (47,90]  
## [4793] (47,90] (17,27] (17,27] (47,90] (36,47] (47,90] (27,36] (27,36]  
## [4801] (17,27] (47,90] (27,36] (36,47] (17,27] (47,90] (47,90] (17,27]  
## [4809] (17,27] (17,27] (17,27] (36,47] (47,90] (36,47] (47,90] (36,47]  
## [4817] (17,27] (36,47] (27,36] (36,47] (17,27] (27,36] (47,90] (17,27]  
## [4825] (36,47] (27,36] (36,47] (36,47] (27,36] (47,90] (27,36] (47,90]  
## [4833] (47,90] (27,36] (27,36] (17,27] (17,27] (47,90] (17,27] (17,27]  
## [4841] (17,27] (47,90] (17,27] (47,90] (47,90] (17,27] (27,36] (17,27]  
## [4849] (27,36] (17,27] (47,90] (27,36] (47,90] (36,47] (47,90] (27,36]  
## [4857] (17,27] (27,36] (47,90] (17,27] (47,90] <NA> (47,90] (47,90]  
## [4865] (47,90] (47,90] (36,47] (36,47] (47,90] (36,47] (27,36] (36,47]  
## [4873] (36,47] (36,47] (47,90] (47,90] (17,27] (47,90] (17,27] (36,47]  
## [4881] (17,27] (17,27] (47,90] (17,27] (27,36] (27,36] (47,90] (27,36]  
## [4889] (47,90] (36,47] (47,90] (36,47] (27,36] (47,90] (27,36] (17,27]  
## [4897] (17,27] (17,27] (17,27] (47,90] (17,27] (47,90] (36,47] (47,90]  
## [4905] (27,36] (36,47] (36,47] (36,47] (47,90] (17,27] (36,47] (27,36]  
## [4913] (36,47] (36,47] (17,27] (27,36] (27,36] (17,27] (47,90] (17,27]  
## [4921] (27,36] (17,27] (27,36] (17,27] (47,90] (27,36] (47,90] (47,90]  
## [4929] (47,90] (27,36] (36,47] (27,36] (36,47] (36,47] (17,27] (36,47]  
## [4937] (17,27] (27,36] (27,36] (17,27] (27,36] (17,27] (36,47] (47,90]  
## [4945] (36,47] (17,27] (36,47] (36,47] (47,90] (36,47] (47,90] (47,90]  
## [4953] (17,27] (36,47] (27,36] (36,47] (36,47] (27,36] (17,27] (27,36]  
## [4961] (36,47] (47,90] (47,90] (36,47] (47,90] (36,47] (17,27] (27,36]  
## [4969] (36,47] (47,90] (27,36] (47,90] (27,36] (17,27] (27,36] (36,47]  
## [4977] (47,90] (47,90] (17,27] (27,36] (47,90] (47,90] (27,36] (47,90]  
## [4985] (27,36] (47,90] (36,47] (27,36] (17,27] (27,36] (36,47] (47,90]  
## [4993] (27,36] (47,90] (47,90] (27,36] (36,47] (27,36] (36,47] (27,36]  
## Levels: (17,27] (27,36] (36,47] (47,90]

df$f.age<-factor(cut(df$age,quantile(df$age),include.lowest = T))  
summary(df$f.age)

## [17,27] (27,36] (36,47] (47,90]   
## 1289 1223 1266 1222

# Reasonable according to target?  
tapply(df$age,df$f.age,median) # OK

## [17,27] (27,36] (36,47] (47,90]   
## 23 32 42 55

# Alternative breaks defined at 30,40,50  
df$f.age<-factor(cut(df$age,c(17,29,39,49,90),include.lowest = T))  
summary(df$f.age)

## [17,29] (29,39] (39,49] (49,90]   
## 1556 1323 1075 1046

levels(df$f.age)<-paste0("f.age-",levels(df$f.age))

## Univariant EDA - Numeric variables

### age

# Numeric indicators - statistics  
summary(df$age)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 17.00 27.00 36.00 38.18 47.00 90.00

quantile(df$age,seq(0,1,by=0.1)) # Decils of df$age

## 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%   
## 17.0 21.0 25.0 29.0 33.0 36.0 40.4 45.0 50.0 58.0 90.0

# Desviació tipus  
sd(df$age)

## [1] 13.63794

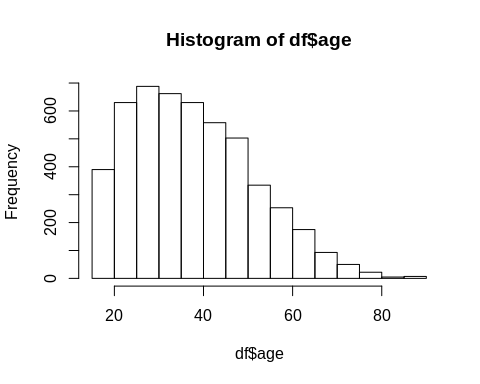
# Variance   
var(df$age)

## [1] 185.9935

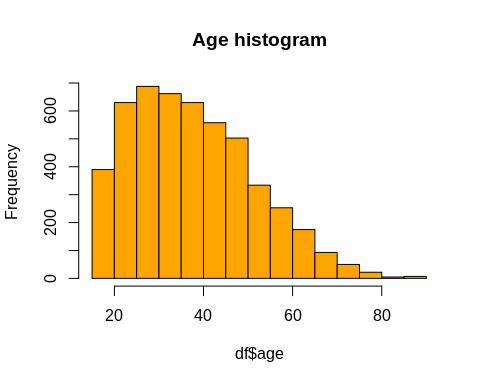
# Coefficient of variation  
sd(df$age)/mean(df$age)

## [1] 0.3571788

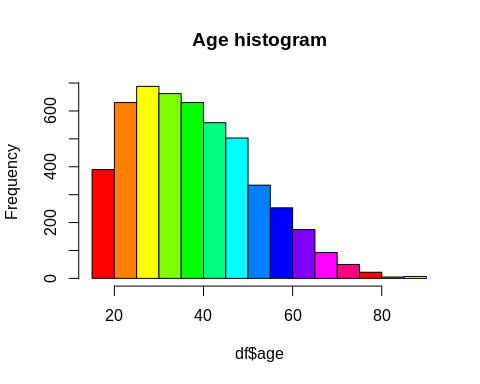
# Graphical tools  
hist(df$age)



hist(df$age,main="Age histogram",col="orange")



hist(df$age,main="Age histogram",col=rainbow(12))

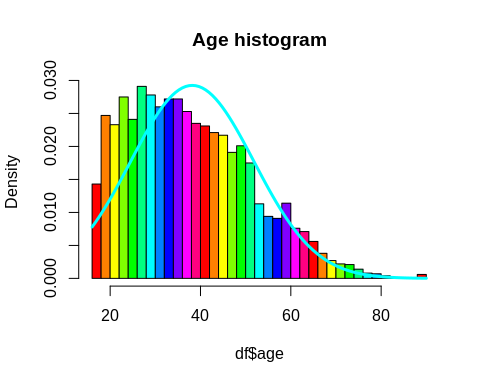


mm<-mean(df$age);dd<-sd(df$age);mm;dd

## [1] 38.1824

## [1] 13.63794

hist(df$age,freq=F,30,main="Age histogram",col=rainbow(12))  
curve(dnorm(x,mean=mm,sd=dd),col="cyan",lwd=3,add=T)



# Outlier detection  
boxplot(df$age,main="Boxplot age")  
summary(df$age)

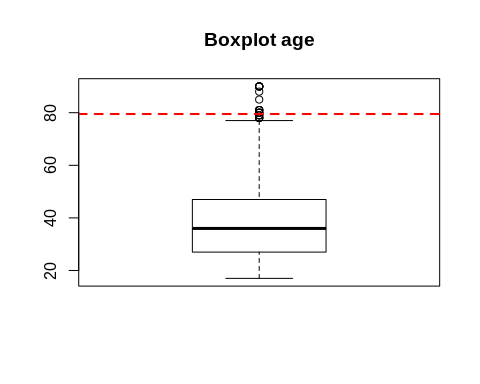
## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 17.00 27.00 36.00 38.18 47.00 90.00

outsev<-48+3\*(48-27)  
outsua<-48+1.5\*(48-27);outsev;outsua

## [1] 111

## [1] 79.5

abline(h=outsua,col="red",lwd=2,lty=2)



# Missing data: initial situation

miss<-countNA(df)  
attributes(miss)

## $names  
## [1] "mis\_col" "mis\_ind"

miss$mis\_col # Number of missing values for each variable

## mis\_x  
## age 0  
## type.employer 288  
## fnlwgt 0  
## education 0  
## education.num 0  
## marital 0  
## occupation 289  
## relationship 0  
## race 0  
## sex 0  
## capital.gain 0  
## capital.loss 0  
## hr.per.week 0  
## country 89  
## y.bin 0  
## f.type 0  
## f.age 0

summary(df)

## age type.employer fnlwgt   
## Min. :17.00 Private :3476 Min. : 13769   
## 1st Qu.:27.00 Self-emp-not-inc: 400 1st Qu.: 117844   
## Median :36.00 Local-gov : 320 Median : 178130   
## Mean :38.18 State-gov : 214 Mean : 191672   
## 3rd Qu.:47.00 Self-emp-inc : 160 3rd Qu.: 240818   
## Max. :90.00 (Other) : 142 Max. :1268339   
## NA's : 288   
## education education.num marital   
## HS-grad :1589 Min. : 1.00 Divorced : 677   
## Some-college:1161 1st Qu.: 9.00 Married-AF-spouse : 2   
## Bachelors : 808 Median :10.00 Married-civ-spouse :2293   
## Masters : 260 Mean :10.05 Married-spouse-absent: 68   
## Assoc-voc : 210 3rd Qu.:12.00 Never-married :1669   
## Assoc-acdm : 166 Max. :16.00 Separated : 144   
## (Other) : 806 Widowed : 147   
## occupation relationship race   
## Craft-repair : 619 Husband :1986 Amer-Indian-Eskimo: 46   
## Exec-managerial: 608 Not-in-family :1280 Asian-Pac-Islander: 171   
## Prof-specialty : 587 Other-relative: 143 Black : 453   
## Adm-clerical : 586 Own-child : 805 Other : 41   
## Sales : 553 Unmarried : 518 White :4289   
## (Other) :1758 Wife : 268   
## NA's : 289   
## sex capital.gain capital.loss hr.per.week   
## Sex-Female:1685 Min. : 0.0 Min. : 0.00 Min. : 1.00   
## Sex-Male :3315 1st Qu.: 0.0 1st Qu.: 0.00 1st Qu.:40.00   
## Median : 0.0 Median : 0.00 Median :40.00   
## Mean : 922.1 Mean : 87.12 Mean :40.55   
## 3rd Qu.: 0.0 3rd Qu.: 0.00 3rd Qu.:45.00   
## Max. :99999.0 Max. :3900.00 Max. :99.00   
##   
## country y.bin f.type   
## United-States:4452 <=50K:3814 f.typ-Civil : 961   
## Mexico : 109 >50K :1186 f.typ-Private:3476   
## Philippines : 28 f.typ-SelfEm : 160   
## England : 21 f.typ-Other : 403   
## Vietnam : 20   
## (Other) : 281   
## NA's : 89   
## f.age   
## f.age-[17,29]:1556   
## f.age-(29,39]:1323   
## f.age-(39,49]:1075   
## f.age-(49,90]:1046   
##   
##   
##

miss$mis\_ind # Number of missing values in variables for each observation

## [1] 0 0 1 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2  
## [35] 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 2 0  
## [69] 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [103] 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0  
## [137] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [171] 0 0 0 2 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [205] 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 1 0 0 0  
## [239] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [273] 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [307] 0 0 0 2 0 0 0 2 0 0 0 2 0 0 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [341] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 3 0 0  
## [375] 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [409] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [443] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0  
## [477] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [511] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0  
## [545] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0  
## [579] 0 2 0 0 0 0 0 2 0 0 0 0 0 0 2 0 0 2 0 0 0 0 2 2 0 0 0 0 0 0 0 2 0 0  
## [613] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 2 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0  
## [647] 2 0 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0  
## [681] 0 0 0 0 0 2 0 0 0 0 0 0 0 2 2 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0  
## [715] 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [749] 0 0 0 2 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [783] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [817] 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2  
## [851] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [885] 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [919] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 2 0 3 0 0 0 0 0 0 0 1 0 0 0 0 0 0  
## [953] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0  
## [987] 0 0 0 0 0 0 0 0 0 2 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 2  
## [1021] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1055] 0 0 0 0 0 0 1 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1089] 1 0 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1123] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1157] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1191] 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1225] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0 0 0 0 2 2 0 0 0 0 0 0 0 0 0  
## [1259] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1293] 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [1327] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [1361] 2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1395] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0  
## [1429] 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 2 0 0  
## [1463] 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1497] 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [1531] 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0  
## [1565] 0 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1599] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0  
## [1633] 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [1667] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0  
## [1701] 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1735] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 1 0 0 0 0 0  
## [1769] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1803] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [1837] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0  
## [1871] 0 0 0 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0  
## [1905] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [1939] 0 0 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0  
## [1973] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [2007] 0 0 0 0 1 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2041] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2 0 0  
## [2075] 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 2 0 0  
## [2109] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0  
## [2143] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0  
## [2177] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2  
## [2211] 0 0 0 1 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0  
## [2245] 0 0 0 0 0 0 0 0 0 2 0 0 0 0 1 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0  
## [2279] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2313] 0 0 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 1 0 1 0  
## [2347] 0 0 0 1 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2381] 0 0 0 0 0 0 0 0 2 0 2 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2  
## [2415] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0  
## [2449] 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2  
## [2483] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 2 2 0 0 0 0 0 0 0  
## [2517] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [2551] 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2585] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2619] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2653] 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0  
## [2687] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0  
## [2721] 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 0 0 0 0  
## [2755] 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0  
## [2789] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 2 0 0 0 0 0 0 0 0  
## [2823] 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [2857] 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0  
## [2891] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2925] 0 0 0 0 1 0 2 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2959] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 1 0 2 2 1 0 0 0 0 0 0 0 0 0  
## [2993] 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3027] 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3061] 2 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3095] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3129] 0 0 0 0 0 0 0 0 2 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 2 0  
## [3163] 0 0 0 0 0 0 0 2 0 0 0 0 2 0 0 2 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0  
## [3197] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 0 0 0 0 0 0  
## [3231] 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3265] 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3299] 2 0 0 0 1 0 0 0 2 0 0 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3333] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3367] 0 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0  
## [3401] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0  
## [3435] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0  
## [3469] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0  
## [3503] 0 0 0 2 0 0 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 2 0 0 0 0 0  
## [3537] 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3571] 0 0 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0  
## [3605] 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [3639] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 3 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0  
## [3673] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0  
## [3707] 0 0 0 0 2 2 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [3741] 0 0 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3775] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3809] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 0 0  
## [3843] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2  
## [3877] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0  
## [3911] 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0  
## [3945] 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 2  
## [3979] 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2  
## [4013] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 2  
## [4047] 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4081] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4115] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0  
## [4149] 0 0 0 0 0 0 0 2 0 2 0 0 0 0 2 0 0 0 0 0 0 2 0 0 0 0 0 0 2 2 0 0 0 0  
## [4183] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4217] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0  
## [4251] 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0  
## [4285] 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0  
## [4319] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 2 0 0 0 0 0  
## [4353] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 1 0 0 0  
## [4387] 0 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4421] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1  
## [4455] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0  
## [4489] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4523] 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4557] 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 2 0 0 0 0 1 0 0 2 0  
## [4591] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4625] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4659] 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 0 0 0 0 0 0 0 0 0  
## [4693] 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0  
## [4727] 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4761] 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 0 0 0 0 0  
## [4795] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4829] 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0  
## [4863] 0 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0  
## [4897] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 2 0  
## [4931] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4965] 0 0 0 0 0 0 0 0 0 1 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0  
## [4999] 0 2

summary(miss$mis\_ind)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.0000 0.0000 0.0000 0.1332 0.0000 3.0000

quantile(miss$mis\_ind,seq(0,1,0.1))

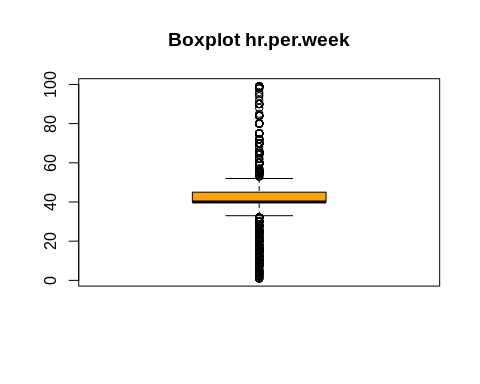
## 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%   
## 0 0 0 0 0 0 0 0 0 0 3

# Outliers and Errors: initial situation

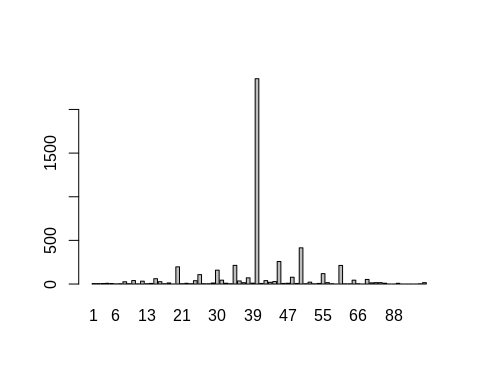
iout<-rep(0,nrow(df))  
jout<-rep(0,length(vars\_con))  
  
ierr<-rep(0,nrow(df))  
jerr<-rep(0,ncol(df))

## hr.per.week (numeric target)

summ<-summary(df$hr.per.week)  
boxplot(df$hr.per.week,main="Boxplot hr.per.week",col="orange")



barplot(table(df$hr.per.week))



iqr<-summ[5]-summ[2];iqr

## 3rd Qu.   
## 5

souts<-summ[5]+3\*iqr # upper threshold  
souti<-summ[2]-3\*iqr# lower threshold  
souti;souts

## 1st Qu.   
## 25

## 3rd Qu.   
## 60

ll<-which((df$hr.per.week<souti)|(df$hr.per.week>souts));length(ll)

## [1] 704

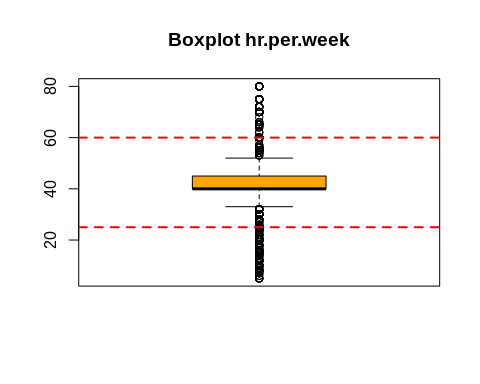
ll<-which((df$hr.per.week<5)|(df$hr.per.week>80));length(ll)

## [1] 66

### Special treatment: target - Errors or Severe outliers - Remove  
  
dff<-df[-ll,]  
  
### End Special treatment: target - Errors or Severe outliers - Remove  
  
# Update iout,jout,ierr,jerr  
jerr[13]<-jerr[13]+length(ll)  
ierr[ll]<-ierr[ll]+1  
  
calcQ(df$hr.per.week)

## $souti  
## 1st Qu.   
## 25   
##   
## $mouti  
## 1st Qu.   
## 32.5   
##   
## $min  
## Min.   
## 1   
##   
## $q1  
## 1st Qu.   
## 40   
##   
## $q2  
## Median   
## 40   
##   
## $q3  
## 3rd Qu.   
## 45   
##   
## $max  
## Max.   
## 99   
##   
## $mouts  
## 3rd Qu.   
## 52.5   
##   
## $souts  
## 3rd Qu.   
## 60

boxplot(dff$hr.per.week,main="Boxplot hr.per.week",col="orange")  
abline(h=calcQ(dff$hr.per.week)$souti,lwd=2,col="red",lty=2)  
abline(h=calcQ(dff$hr.per.week)$souts,lwd=2,col="red",lty=2)



Fer per totes les variables numèriques (outliers i errors) i factors (errors, si cal identifiqueu les categories missing).

# Imputation

Set some reasonable value to missing data. Missing can be an original missing or an error/outlier set to missing