# Kira Plastina Ecommerce customers

## Defining the question

### Specifying the question

We would like to see the characteristics of the datasets and ### Defining the metric for success Correctly identifying the clusters in the dataset ### Understanding the context Kira Plastinina is a Russian brand that is sold through a defunct chain of retail stores in Russia, Ukraine, Kazakhstan, Belarus, China, Philippines, and Armenia. The brand’s Sales and Marketing team would like to understand their customer’s behavior from data that they have collected over the past year. More specifically, they would like to learn the characteristics of customer groups. ### Recording the experimental design We will be following the procedure below in our analysis: 1. Read the data 2. Check the data 3. Clean the data 4. Perform Analysis on the data 5. Implement the model ## Reading the dataset We will use the readr package to read the dataset

library(readr)  
online\_shoppers\_intention <- read\_csv("C:/Users/mutho/Downloads/online\_shoppers\_intention.csv")

##   
## -- Column specification ---------------------------------------------------------  
## cols(  
## Administrative = col\_double(),  
## Administrative\_Duration = col\_double(),  
## Informational = col\_double(),  
## Informational\_Duration = col\_double(),  
## ProductRelated = col\_double(),  
## ProductRelated\_Duration = col\_double(),  
## BounceRates = col\_double(),  
## ExitRates = col\_double(),  
## PageValues = col\_double(),  
## SpecialDay = col\_double(),  
## Month = col\_character(),  
## OperatingSystems = col\_double(),  
## Browser = col\_double(),  
## Region = col\_double(),  
## TrafficType = col\_double(),  
## VisitorType = col\_character(),  
## Weekend = col\_logical(),  
## Revenue = col\_logical()  
## )

View(online\_shoppers\_intention)

online\_shoppers <- online\_shoppers\_intention

## Checking the dataset

# Checking the top of the dataset   
head(online\_shoppers)

## Warning: `...` is not empty.  
##   
## We detected these problematic arguments:  
## \* `needs\_dots`  
##   
## These dots only exist to allow future extensions and should be empty.  
## Did you misspecify an argument?

## # A tibble: 6 x 18  
## Administrative Administrative\_~ Informational Informational\_D~ ProductRelated  
## <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 0 0 0 0 1  
## 2 0 0 0 0 2  
## 3 0 -1 0 -1 1  
## 4 0 0 0 0 2  
## 5 0 0 0 0 10  
## 6 0 0 0 0 19  
## # ... with 13 more variables: ProductRelated\_Duration <dbl>, BounceRates <dbl>,  
## # ExitRates <dbl>, PageValues <dbl>, SpecialDay <dbl>, Month <chr>,  
## # OperatingSystems <dbl>, Browser <dbl>, Region <dbl>, TrafficType <dbl>,  
## # VisitorType <chr>, Weekend <lgl>, Revenue <lgl>

# Checking the datatypes of the dataset   
str(online\_shoppers)

## tibble [12,330 x 18] (S3: spec\_tbl\_df/tbl\_df/tbl/data.frame)  
## $ Administrative : num [1:12330] 0 0 0 0 0 0 0 1 0 0 ...  
## $ Administrative\_Duration: num [1:12330] 0 0 -1 0 0 0 -1 -1 0 0 ...  
## $ Informational : num [1:12330] 0 0 0 0 0 0 0 0 0 0 ...  
## $ Informational\_Duration : num [1:12330] 0 0 -1 0 0 0 -1 -1 0 0 ...  
## $ ProductRelated : num [1:12330] 1 2 1 2 10 19 1 1 2 3 ...  
## $ ProductRelated\_Duration: num [1:12330] 0 64 -1 2.67 627.5 ...  
## $ BounceRates : num [1:12330] 0.2 0 0.2 0.05 0.02 ...  
## $ ExitRates : num [1:12330] 0.2 0.1 0.2 0.14 0.05 ...  
## $ PageValues : num [1:12330] 0 0 0 0 0 0 0 0 0 0 ...  
## $ SpecialDay : num [1:12330] 0 0 0 0 0 0 0.4 0 0.8 0.4 ...  
## $ Month : chr [1:12330] "Feb" "Feb" "Feb" "Feb" ...  
## $ OperatingSystems : num [1:12330] 1 2 4 3 3 2 2 1 2 2 ...  
## $ Browser : num [1:12330] 1 2 1 2 3 2 4 2 2 4 ...  
## $ Region : num [1:12330] 1 1 9 2 1 1 3 1 2 1 ...  
## $ TrafficType : num [1:12330] 1 2 3 4 4 3 3 5 3 2 ...  
## $ VisitorType : chr [1:12330] "Returning\_Visitor" "Returning\_Visitor" "Returning\_Visitor" "Returning\_Visitor" ...  
## $ Weekend : logi [1:12330] FALSE FALSE FALSE FALSE TRUE FALSE ...  
## $ Revenue : logi [1:12330] FALSE FALSE FALSE FALSE FALSE FALSE ...  
## - attr(\*, "spec")=  
## .. cols(  
## .. Administrative = col\_double(),  
## .. Administrative\_Duration = col\_double(),  
## .. Informational = col\_double(),  
## .. Informational\_Duration = col\_double(),  
## .. ProductRelated = col\_double(),  
## .. ProductRelated\_Duration = col\_double(),  
## .. BounceRates = col\_double(),  
## .. ExitRates = col\_double(),  
## .. PageValues = col\_double(),  
## .. SpecialDay = col\_double(),  
## .. Month = col\_character(),  
## .. OperatingSystems = col\_double(),  
## .. Browser = col\_double(),  
## .. Region = col\_double(),  
## .. TrafficType = col\_double(),  
## .. VisitorType = col\_character(),  
## .. Weekend = col\_logical(),  
## .. Revenue = col\_logical()  
## .. )

# Getting the shape of the dataset   
dim(online\_shoppers)

## [1] 12330 18

# Finding out the class of the dataset   
class(online\_shoppers)

## [1] "spec\_tbl\_df" "tbl\_df" "tbl" "data.frame"

## Cleaning the dataset

We will begin by looking at the missing data

# Checking the number of missing values in the columns   
colSums(is.na(online\_shoppers))

## Administrative Administrative\_Duration Informational   
## 14 14 14   
## Informational\_Duration ProductRelated ProductRelated\_Duration   
## 14 14 14   
## BounceRates ExitRates PageValues   
## 14 14 0   
## SpecialDay Month OperatingSystems   
## 0 0 0   
## Browser Region TrafficType   
## 0 0 0   
## VisitorType Weekend Revenue   
## 0 0 0

# Removing the missing values in the columns   
online\_shoppers <-na.omit(online\_shoppers)

Now we are changing the categorical columns to numerical columns.

unique(online\_shoppers$VisitorType)

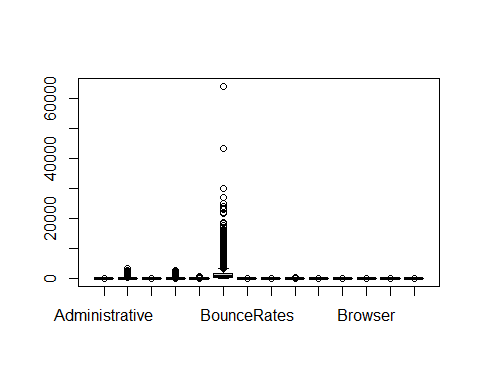
## [1] "Returning\_Visitor" "New\_Visitor" "Other"

online\_shoppers <-data.matrix(online\_shoppers)

We will now proceed to look for outliers

# We first remove the categorical columns   
online\_numericals <- subset(online\_shoppers, select = -c(Month,`VisitorType`,Weekend,Revenue))

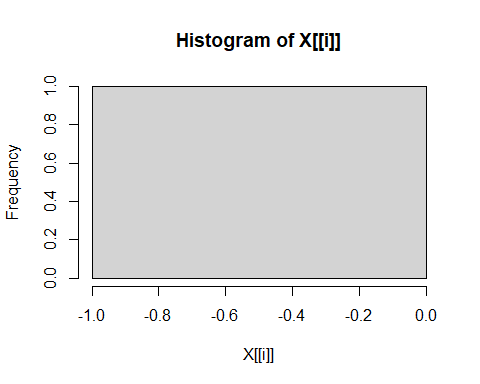
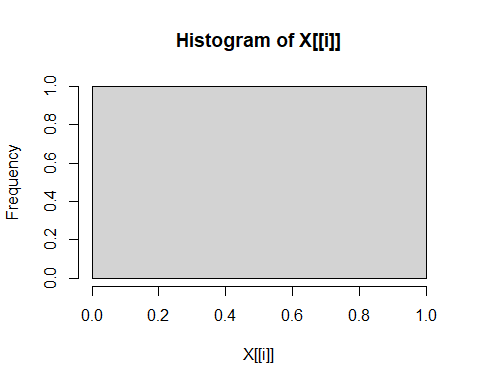
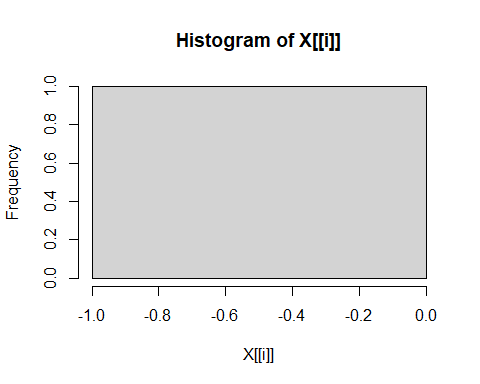
boxplot(online\_numericals)

 ## Exploratory Data Analysis

str(online\_numericals)

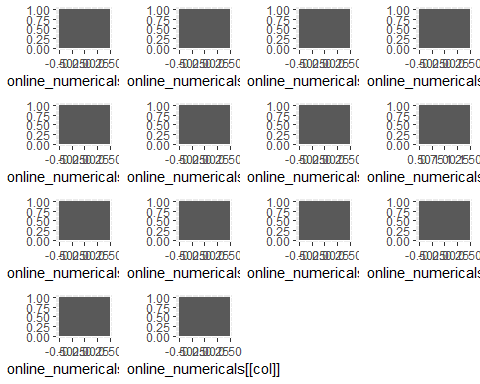
## num [1:12316, 1:14] 0 0 0 0 0 0 0 1 0 0 ...  
## - attr(\*, "dimnames")=List of 2  
## ..$ : NULL  
## ..$ : chr [1:14] "Administrative" "Administrative\_Duration" "Informational" "Informational\_Duration" ...

library(ggplot2)  
library(cowplot)  
lapply(online\_numericals[1:14], FUN=hist)



## [[1]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[2]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[3]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[4]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[5]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[6]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[7]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[8]]  
## $breaks  
## [1] 0 1  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] 0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[9]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[10]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[11]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[12]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[13]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"  
##   
## [[14]]  
## $breaks  
## [1] -1 0  
##   
## $counts  
## [1] 1  
##   
## $density  
## [1] 1  
##   
## $mids  
## [1] -0.5  
##   
## $xname  
## [1] "X[[i]]"  
##   
## $equidist  
## [1] TRUE  
##   
## attr(,"class")  
## [1] "histogram"

list <-lapply(1:ncol(online\_numericals),  
 function(col) ggplot2::qplot(online\_numericals[[col]],  
 geom = "histogram",  
 binwidth = 1))  
  
cowplot::plot\_grid(plotlist = list)



summary(online\_shoppers)

## Administrative Administrative\_Duration Informational   
## Min. : 0.000 Min. : -1.00 Min. : 0.000   
## 1st Qu.: 0.000 1st Qu.: 0.00 1st Qu.: 0.000   
## Median : 1.000 Median : 8.00 Median : 0.000   
## Mean : 2.318 Mean : 80.91 Mean : 0.504   
## 3rd Qu.: 4.000 3rd Qu.: 93.50 3rd Qu.: 0.000   
## Max. :27.000 Max. :3398.75 Max. :24.000   
## Informational\_Duration ProductRelated ProductRelated\_Duration  
## Min. : -1.00 Min. : 0.00 Min. : -1.0   
## 1st Qu.: 0.00 1st Qu.: 7.00 1st Qu.: 185.0   
## Median : 0.00 Median : 18.00 Median : 599.8   
## Mean : 34.51 Mean : 31.76 Mean : 1196.0   
## 3rd Qu.: 0.00 3rd Qu.: 38.00 3rd Qu.: 1466.5   
## Max. :2549.38 Max. :705.00 Max. :63973.5   
## BounceRates ExitRates PageValues SpecialDay   
## Min. :0.000000 Min. :0.00000 Min. : 0.000 Min. :0.0000   
## 1st Qu.:0.000000 1st Qu.:0.01429 1st Qu.: 0.000 1st Qu.:0.0000   
## Median :0.003119 Median :0.02512 Median : 0.000 Median :0.0000   
## Mean :0.022152 Mean :0.04300 Mean : 5.896 Mean :0.0615   
## 3rd Qu.:0.016684 3rd Qu.:0.05000 3rd Qu.: 0.000 3rd Qu.:0.0000   
## Max. :0.200000 Max. :0.20000 Max. :361.764 Max. :1.0000   
## Month OperatingSystems Browser Region   
## Min. : 1.000 Min. :1.000 Min. : 1.000 Min. :1.000   
## 1st Qu.: 6.000 1st Qu.:2.000 1st Qu.: 2.000 1st Qu.:1.000   
## Median : 7.000 Median :2.000 Median : 2.000 Median :3.000   
## Mean : 6.164 Mean :2.124 Mean : 2.358 Mean :3.148   
## 3rd Qu.: 8.000 3rd Qu.:3.000 3rd Qu.: 2.000 3rd Qu.:4.000   
## Max. :10.000 Max. :8.000 Max. :13.000 Max. :9.000   
## TrafficType VisitorType Weekend Revenue   
## Min. : 1.00 Min. :1.000 Min. :0.0000 Min. :0.0000   
## 1st Qu.: 2.00 1st Qu.:3.000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median : 2.00 Median :3.000 Median :0.0000 Median :0.0000   
## Mean : 4.07 Mean :2.718 Mean :0.2326 Mean :0.1549   
## 3rd Qu.: 4.00 3rd Qu.:3.000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :20.00 Max. :3.000 Max. :1.0000 Max. :1.0000

## Modelling

result<- kmeans(online\_shoppers,3)   
result

## K-means clustering with 3 clusters of sizes 207, 1975, 10134  
##   
## Cluster means:  
## Administrative Administrative\_Duration Informational Informational\_Duration  
## 1 7.439614 295.36489 2.7487923 266.72309  
## 2 4.325063 154.87748 1.1741772 84.67262  
## 3 1.821985 62.10943 0.3275113 19.98624  
## ProductRelated ProductRelated\_Duration BounceRates ExitRates PageValues  
## 1 236.10628 10886.1744 0.005939756 0.01968831 4.521370  
## 2 77.72962 3355.1075 0.007128234 0.02167056 8.013634  
## 3 18.63173 577.3255 0.025411677 0.04763612 5.511318  
## SpecialDay Month OperatingSystems Browser Region TrafficType  
## 1 0.03091787 6.782609 2.149758 2.309179 2.584541 3.618357  
## 2 0.05073418 6.496709 2.136203 2.310380 3.094177 3.710380  
## 3 0.06421946 6.086639 2.121275 2.367772 3.170022 4.149891  
## VisitorType Weekend Revenue  
## 1 2.985507 0.2512077 0.3381643  
## 2 2.901772 0.2192405 0.2511392  
## 3 2.676732 0.2348530 0.1324255  
##   
## Clustering vector:  
## [1] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2  
## [37] 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3  
## [73] 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 3 3 3 3  
## [109] 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3  
## [145] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [181] 3 3 3 3 3 3 3 2 3 2 3 2 3 3 3 2 2 2 3 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [217] 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 2 2 2  
## [253] 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 2  
## [289] 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 2 3 3 3 3 3 3 3 3  
## [325] 2 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 3  
## [361] 3 3 3 2 3 3 3 2 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3  
## [397] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3  
## [433] 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 2 3 3 3  
## [469] 3 3 2 3 3 3 3 3 2 2 3 3 2 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 2 3 3 2 2  
## [505] 3 3 3 3 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [541] 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 2  
## [577] 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 2 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 2 2  
## [613] 2 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [649] 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [685] 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [721] 3 3 2 3 3 3 3 3 3 3 3 3 3 3 2 2 3 3 3 2 2 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3  
## [757] 3 3 3 3 2 3 3 3 3 3 3 3 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [793] 3 3 3 3 2 3 3 1 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3  
## [829] 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3  
## [865] 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [901] 3 3 3 3 3 2 2 3 3 3 3 3 2 3 3 2 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 2 3 3 3 3  
## [937] 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 3 3 3  
## [973] 3 3 3 3 3 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3  
## [1009] 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 2 3 3 3 3 3 3 3 3 3 3 2 1 3 3 3 3 3 3  
## [1045] 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1081] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1117] 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 1 3 3 2 3 3 3 3 3 3 3 3  
## [1153] 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 3 3 3 3 3 3 3 3  
## [1189] 3 3 2 3 3 3 2 3 3 3 3 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2  
## [1225] 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3  
## [1261] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1297] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1333] 3 2 3 3 3 3 3 3 2 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3  
## [1369] 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1405] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3  
## [1441] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 2 2  
## [1477] 3 3 2 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 3 2 3 3  
## [1513] 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 2 3 3 3 3 3 3 3 2 3 3 3 2 3 1 3  
## [1549] 3 3 3 3 3 3 2 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
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## [1] 6823243459 3291367530 3096509687  
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