Master en Big Data. Fundamentos Matemáticos del Análisis de Datos (FMAD).

Tarea 1

Departamento de Matemática Aplicada

Curso 2021-22. Última actualización: 2021-09-16

Preliminares

library(tidyverse)

## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --

## v ggplot2 3.3.5 v purrr 0.3.4  
## v tibble 3.1.4 v dplyr 1.0.7  
## v tidyr 1.1.3 v stringr 1.4.0  
## v readr 2.0.1 v forcats 0.5.1

## -- Conflicts ------------------------------------------ tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()

library(ggplot2)  
library(haven)  
library(nycflights13)  
library(gridExtra)

##   
## Attaching package: 'gridExtra'

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

# Instrucciones preliminares

* Empieza abriendo el proyecto de RStudio correspondiente a tu repositorio personal de la asignatura.
* En todas las tareas tendrás que repetir un proceso como el descrito en la sección *Repite los pasos Creando un fichero Rmarkdown para esta práctica* de la *Práctica00*. Puedes releer la sección *Practicando la entrega de las Tareas* de esa misma práctica para recordar el procedimiento de entrega.

# Ejercicio 0

* Si no has hecho los *Ejercicios* de la *Práctica00* (págs. 12 y 13) hazlos ahora y añádelos a esta tarea. Si ya los has hecho y entregado a través de GitHub no hace falta que hagas nada.

# Ejercicio 1. Análisis exploratorio de un conjunto de datos y operaciones con dplyr.

* Vamos a utilizar el conjunto de datos contenido en el fichero (es un enlace):  
  [cholesterol.csv](https://gist.githubusercontent.com/fsansegundo/ee991e53e1a571dd34034c42b5516eae/raw/2206455b5772e90c5a2a24a3f42a84408fd1d1c5/cholesterol.csv)  
  Los datos proceden de un estudio realizado en la *University of Virginia School of Medicine* que investiga la prevalencia de la obesidad, la diabetes y otros factores de riesgo cardiovascular. Se puede encontrar más información sobre el fichero en este enlace:  
  <https://biostat.app.vumc.org/wiki/pub/Main/DataSets/diabetes.html>
* Carga el conjunto de datos en un data.frame de R llamado chlstrl.

chlstrl=read.csv("./data/cholesterol.csv")

* Empezaremos por información básica sobre el conjunto de datos. Cuántas observaciones contiene, cuáles son las variables y de qué tipos,…

str(chlstrl)

## 'data.frame': 403 obs. of 7 variables:  
## $ chol : int 203 165 228 78 249 248 195 227 177 263 ...  
## $ age : int 46 29 58 67 64 34 30 37 45 55 ...  
## $ gender: chr "female" "female" "female" "male" ...  
## $ height: int 62 64 61 67 68 71 69 59 69 63 ...  
## $ weight: int 121 218 256 119 183 190 191 170 166 202 ...  
## $ waist : int 29 46 49 33 44 36 46 34 34 45 ...  
## $ hip : int 38 48 57 38 41 42 49 39 40 50 ...

* Asegúrate de comprobar si hay datos ausentes y localízalos en la tabla.

#Esto nos permite saber cuántos valores son NA y cuántos no lo son de la tabla completa  
table(is.na(chlstrl))

##   
## FALSE TRUE   
## 2810 11

#Esto nos permite saber la localización de cada valor na en la tabla (con head solo salen las 6 primeras filas)  
head(is.na(chlstrl))

## chol age gender height weight waist hip  
## [1,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  
## [2,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  
## [3,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  
## [4,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  
## [5,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  
## [6,] FALSE FALSE FALSE FALSE FALSE FALSE FALSE

summary(chlstrl)

## chol age gender height   
## Min. : 78.0 Min. :19.00 Length:403 Min. :52.00   
## 1st Qu.:179.0 1st Qu.:34.00 Class :character 1st Qu.:63.00   
## Median :204.0 Median :45.00 Mode :character Median :66.00   
## Mean :207.8 Mean :46.85 Mean :66.02   
## 3rd Qu.:230.0 3rd Qu.:60.00 3rd Qu.:69.00   
## Max. :443.0 Max. :92.00 Max. :76.00   
## NA's :1 NA's :5   
## weight waist hip   
## Min. : 99.0 Min. :26.0 Min. :30.00   
## 1st Qu.:151.0 1st Qu.:33.0 1st Qu.:39.00   
## Median :172.5 Median :37.0 Median :42.00   
## Mean :177.6 Mean :37.9 Mean :43.04   
## 3rd Qu.:200.0 3rd Qu.:41.0 3rd Qu.:46.00   
## Max. :325.0 Max. :56.0 Max. :64.00   
## NA's :1 NA's :2 NA's :2

* El análisis exploratorio (numérico y gráfico) debe cubrir todos los tipos de variable de la tabla. Es decir, que al menos debes estudiar una variable por cada tipo de variable presente en la tabla. El análisis debe contener, al menos:
  + Para las variables cuantitativas (continuas o discretas).  
    Resumen numérico básico.  
    Gráficas (las adecuadas, a ser posible más de un tipo de gráfico).

#Recorrido intercuartílico  
IQR(chlstrl$chol,na.rm=TRUE)

## [1] 51

#Los valores atípicos  
unname(quantile(chlstrl$chol,probs=c(1/4, 3/4), na.rm=TRUE) + c(-1,1) \* 1.5 \* IQR(chlstrl$chol,na.rm=TRUE))

## [1] 102.5 306.5

#La desviación estándar  
sd(chlstrl$chol, na.rm=TRUE)

## [1] 44.44556

#La varianza  
var(chlstrl$chol, na.rm=TRUE)

## [1] 1975.408

1)HISTOGRAMA

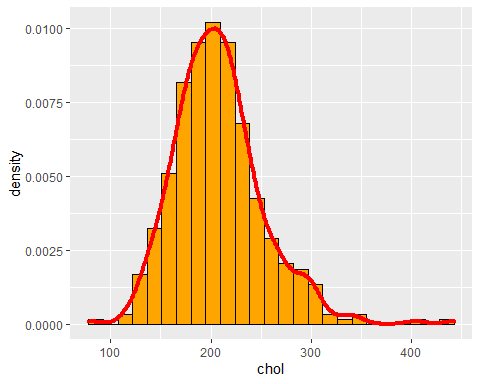
summary(chlstrl$chol)

## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's   
## 78.0 179.0 204.0 207.8 230.0 443.0 1

#En este chunk se realiza el histograma de la variable colesterol, interpretada como continua  
  
cortes=seq(min(chlstrl$chol, na.rm=T),max(chlstrl$chol, na.rm=T), length.out=26)  
  
ggplot(chlstrl, aes(chol)) +  
geom\_histogram(aes(y=stat(density)),breaks=cortes, fill="orange", color="black") +  
geom\_density(color="red",size=1.5)

## Warning: Removed 1 rows containing non-finite values (stat\_bin).

## Warning: Removed 1 rows containing non-finite values (stat\_density).



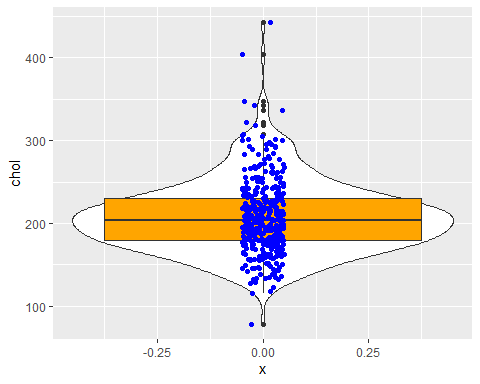
2)Violin/Boxplot

#Aqui se realiza el diagrama boxplot/violín/dispersión de una variable discreta  
ggplot(chlstrl)+  
 geom\_violin(mapping = aes(x=0, y=chol))+  
 geom\_boxplot(mapping = aes(y=chol),fill="orange") +   
 geom\_jitter(aes(x=0, y=chol),  
 position=position\_jitter(w=0.05, h=0), col="blue")

## Warning: Removed 1 rows containing non-finite values (stat\_ydensity).

## Warning: Removed 1 rows containing non-finite values (stat\_boxplot).

## Warning: Removed 1 rows containing missing values (geom\_point).



* Variables categóricas (factores).  
  Tablas de frecuencia (absolutas y relativas).  
  Gráficas (diagrama de barras).

summary(chlstrl$gender)

## Length Class Mode   
## 403 character character

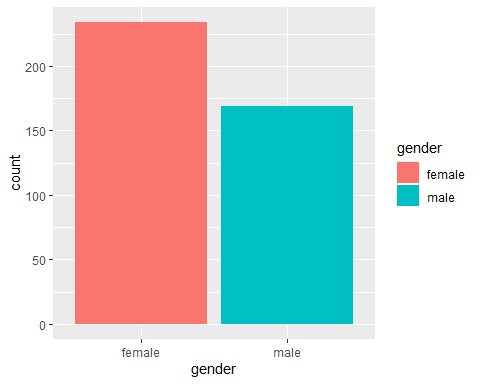
#table(chlstrl$gender)  
#prop.table(table(chlstrl$gender))  
  
  
#Tabulación de géneros según su frecuencia  
chlstrl %>%  
 count(gender)

## gender n  
## 1 female 234  
## 2 male 169

#Tabulación de géneros según su frecuencia relativa   
  
chlstrl %>%   
 count(gender) %>%  
 mutate(gender, relFreq = prop.table(n), n=NULL)

## gender relFreq  
## 1 female 0.5806452  
## 2 male 0.4193548

ggplot(chlstrl) +   
 geom\_bar(aes(gender, fill=gender))



* Los valores de height y weight están en pulgadas (inches) y libras (pounds) respectivamente. Una libra son 0.454kg y una pulgada son 0.0254m. Usa dplyr para convertir esas columnas a metros y kilogramos respectivamente. Las nuevas columnas deben llamarse igual que las originales.

#Sustitución de las columnas de peso y altura por sus equivalentes en el sistema métrico  
chlstrl=chlstrl %>%   
 mutate(height=height\*0.0254, weight=weight\*0.454)  
  
(chlstrl)

## chol age gender height weight waist hip  
## 1 203 46 female 1.5748 54.934 29 38  
## 2 165 29 female 1.6256 98.972 46 48  
## 3 228 58 female 1.5494 116.224 49 57  
## 4 78 67 male 1.7018 54.026 33 38  
## 5 249 64 male 1.7272 83.082 44 41  
## 6 248 34 male 1.8034 86.260 36 42  
## 7 195 30 male 1.7526 86.714 46 49  
## 8 227 37 male 1.4986 77.180 34 39  
## 9 177 45 male 1.7526 75.364 34 40  
## 10 263 55 female 1.6002 91.708 45 50  
## 11 242 60 female 1.6510 70.824 39 45  
## 12 215 38 female 1.4732 88.530 42 50  
## 13 238 27 female 1.5240 77.180 35 41  
## 14 183 40 female 1.4986 74.910 37 43  
## 15 191 36 male 1.7526 83.082 36 40  
## 16 213 33 female 1.6510 71.278 37 41  
## 17 255 50 female 1.6510 83.082 37 43  
## 18 230 20 male 1.7018 72.186 31 39  
## 19 194 36 male 1.6256 57.204 30 34  
## 20 196 62 female 1.6510 88.984 46 51  
## 21 186 70 male 1.7018 80.812 42 41  
## 22 234 47 male 1.7018 104.420 45 46  
## 23 203 38 female 1.7526 130.752 48 55  
## 24 281 66 female 1.5748 83.990 48 44  
## 25 228 24 female 1.5494 51.302 33 38  
## 26 179 41 female 1.8288 53.572 28 36  
## 27 232 37 male 1.7272 114.408 43 47  
## 28 NA 48 male 1.7272 45.400 27 33  
## 29 254 43 female 1.5748 65.830 31 38  
## 30 215 40 male 1.7780 85.806 37 39  
## 31 177 42 female 1.6510 78.996 37 40  
## 32 182 52 male 1.7272 63.106 29 35  
## 33 265 61 male 1.8796 86.714 39 41  
## 34 182 61 female 1.7526 78.996 49 43  
## 35 199 25 male 1.6764 53.572 32 34  
## 36 183 47 female 1.6764 84.444 39 44  
## 37 194 35 male 1.6764 72.186 31 35  
## 38 190 46 male 1.8288 93.070 46 49  
## 39 173 57 male 1.8034 65.830 31 36  
## 40 182 70 male 1.7526 97.156 45 48  
## 41 136 22 female 1.6764 72.640 35 40  
## 42 218 52 female 1.5748 77.180 40 43  
## 43 225 36 male 1.7018 87.168 40 42  
## 44 262 43 male 1.9050 114.862 43 49  
## 45 213 72 female 1.4986 62.198 40 40  
## 46 243 37 female 1.6256 105.782 49 57  
## 47 148 54 female 1.7018 74.910 42 42  
## 48 128 60 male 1.7018 88.984 42 43  
## 49 169 40 female 1.6510 81.720 40 44  
## 50 157 55 female 1.6764 99.426 43 52  
## 51 196 76 male 1.6510 69.916 37 41  
## 52 237 43 female 1.6256 82.174 36 46  
## 53 212 65 female 1.5494 84.898 43 47  
## 54 233 45 female 1.6256 75.818 39 44  
## 55 289 70 female 1.5240 99.880 51 54  
## 56 193 20 female 1.7272 124.396 49 58  
## 57 204 62 male 1.7272 81.720 38 41  
## 58 165 92 female 1.5748 98.518 51 51  
## 59 237 49 female 1.5748 85.806 43 47  
## 60 218 44 female 1.6764 86.714 40 45  
## 61 296 74 female 1.6002 83.082 42 48  
## 62 178 36 male 1.7780 73.094 34 40  
## 63 443 51 female 1.7780 106.690 43 48  
## 64 145 38 female NA 56.750 31 35  
## 65 234 31 male 1.7780 74.910 35 39  
## 66 146 28 female 1.6256 57.204 28 32  
## 67 223 22 female 1.5748 62.198 28 35  
## 68 213 71 female 1.6002 74.910 34 42  
## 69 173 76 female 1.5494 46.308 31 33  
## 70 232 91 female 1.5494 57.658 35 38  
## 71 171 40 male 1.8034 97.156 41 39  
## 72 164 23 female 1.7526 111.230 44 47  
## 73 170 20 female 1.6256 73.094 37 40  
## 74 180 40 female 1.7272 119.856 43 54  
## 75 204 52 male 1.9050 64.468 31 35  
## 76 209 76 female 1.5240 64.922 35 40  
## 77 242 46 female 1.5748 83.082 37 45  
## 78 134 48 male 1.7780 78.542 36 40  
## 79 217 22 female 1.8034 101.242 46 50  
## 80 251 58 female 1.6002 69.916 38 41  
## 81 217 34 male 1.8542 99.426 41 42  
## 82 300 61 female 1.7018 76.726 40 44  
## 83 218 40 male 1.8542 90.800 38 41  
## 84 189 28 female 1.6256 90.800 38 45  
## 85 185 53 female 1.5494 65.830 37 40  
## 86 206 67 male 1.7018 80.812 37 41  
## 87 218 51 female NA 97.610 42 53  
## 88 189 49 female 1.5748 93.070 40 49  
## 89 229 65 female 1.5748 68.554 37 42  
## 90 228 54 male 1.6764 77.180 36 41  
## 91 159 38 male 1.7272 76.726 34 40  
## 92 249 64 female 1.6002 72.186 33 41  
## 93 170 41 female 1.5494 49.940 29 30  
## 94 174 67 male 1.7272 89.892 36 43  
## 95 204 27 female 1.7018 83.990 35 44  
## 96 203 21 female 1.6002 64.468 28 39  
## 97 241 41 female 1.4986 63.106 29 39  
## 98 245 47 female 1.6002 70.824 35 39  
## 99 143 61 female 1.6510 99.880 40 50  
## 100 224 65 male 1.7018 89.438 42 43  
## 101 168 28 female 1.6002 90.800 42 46  
## 102 184 41 male 1.7526 69.916 34 39  
## 103 199 37 female 1.5494 92.162 42 51  
## 104 158 50 male 1.8034 81.720 36 40  
## 105 209 57 female 1.5494 68.100 36 39  
## 106 214 28 male 1.7272 92.616 40 41  
## 107 293 31 female 1.7018 90.800 41 42  
## 108 227 83 female 1.4986 56.750 35 40  
## 109 292 79 male 1.7780 74.910 39 41  
## 110 218 68 male 1.7780 77.180 37 42  
## 111 244 32 male 1.7780 96.248 39 44  
## 112 283 26 male 1.8288 103.058 41 44  
## 113 186 36 male 1.7526 68.100 31 38  
## 114 273 53 female 1.6256 78.996 34 43  
## 115 193 19 female 1.5494 54.026 32 38  
## 116 194 63 male 1.8542 79.450 34 39  
## 117 231 58 female 1.6002 104.420 39 48  
## 118 217 53 female 1.6002 71.732 33 40  
## 119 174 50 male 1.7780 119.402 51 64  
## 120 225 41 male 1.8034 70.824 31 40  
## 121 268 48 male 1.7780 54.480 32 35  
## 122 195 59 female 1.7018 78.088 38 43  
## 123 179 34 male 1.8288 77.180 31 39  
## 124 215 63 female 1.6002 71.732 34 42  
## 125 185 23 male 1.9304 74.456 32 40  
## 126 132 21 female 1.6510 76.726 39 43  
## 127 175 23 female 1.6510 106.690 44 50  
## 128 179 36 female 1.6002 56.750 33 36  
## 129 228 71 female 1.6002 110.776 48 51  
## 130 181 64 male 1.8034 102.150 44 47  
## 131 160 43 female 1.6256 63.560 37 40  
## 132 188 31 female 1.7018 103.058 47 53  
## 133 168 44 female 1.6256 72.640 40 43  
## 134 318 60 female 1.6510 75.818 38 44  
## 135 192 43 female 1.6256 147.550 53 62  
## 136 209 48 female 1.6002 54.934 32 38  
## 137 129 56 male 1.8796 68.554 34 38  
## 138 160 55 female 1.7018 101.242 43 48  
## 139 160 49 male 1.8034 120.764 49 45  
## 140 211 58 male 1.7018 80.358 38 43  
## 141 262 33 female 1.6002 77.180 33 46  
## 142 201 48 female 1.7272 66.284 32 41  
## 143 263 66 female 1.6764 54.934 31 33  
## 144 219 59 male 1.6764 77.180 37 40  
## 145 191 45 female 1.7018 68.554 33 38  
## 146 171 52 male 1.8034 72.186 33 39  
## 147 219 76 male 1.6256 47.670 29 33  
## 148 347 36 male 1.7780 125.758 51 49  
## 149 269 41 female 1.5748 72.640 39 41  
## 150 164 20 male 1.8288 65.830 29 36  
## 151 181 50 male 1.8034 145.280 56 49  
## 152 190 43 female 1.5748 74.002 40 45  
## 153 255 82 male 1.6764 74.002 37 43  
## 154 218 35 male 1.7526 76.726 39 41  
## 155 223 47 female 1.6510 105.328 46 54  
## 156 254 75 male 1.7272 95.340 44 45  
## 157 236 62 male 1.9304 72.640 35 39  
## 158 176 31 female 1.5748 65.830 36 42  
## 159 158 50 male 1.7780 97.610 40 45  
## 160 181 39 female 1.6764 115.770 46 54  
## 161 151 33 male 1.7526 139.832 52 58  
## 162 115 58 male 1.7526 NA 30 37  
## 163 271 81 female 1.6256 71.732 36 43  
## 164 190 27 female 1.6510 95.340 39 47  
## 165 118 47 female 1.6256 55.842 30 36  
## 166 168 33 female 1.6764 53.572 29 35  
## 167 254 67 male 1.7272 75.818 36 39  
## 168 193 42 female 1.9050 84.444 37 46  
## 169 187 21 female 1.6002 71.732 39 43  
## 170 212 51 female 1.6510 65.830 38 42  
## 171 170 27 female 1.6002 54.026 28 37  
## 172 215 51 female 1.7018 128.028 52 59  
## 173 199 71 male 1.7526 77.634 38 40  
## 174 140 50 male 1.7526 78.088 37 41  
## 175 216 54 female 1.6510 62.652 33 39  
## 176 204 59 male 1.8542 84.898 38 37  
## 177 193 59 female 1.6764 85.806 38 45  
## 178 267 40 female 1.4986 92.616 40 47  
## 179 201 58 male 1.6764 97.610 46 44  
## 180 204 72 male 1.6510 75.818 45 46  
## 181 246 66 female 1.6764 85.806 45 46  
## 182 229 23 male 1.8288 81.720 34 41  
## 183 172 42 female 1.6510 74.910 33 45  
## 184 197 43 male 1.8034 81.266 37 44  
## 185 205 75 male 1.7526 92.616 44 42  
## 186 219 65 female 1.6002 105.782 40 53  
## 187 174 34 male 1.8034 95.340 37 43  
## 188 192 37 male 1.8034 88.530 36 43  
## 189 206 61 female 1.6002 90.346 41 47  
## 190 160 36 female 1.6256 83.990 39 45  
## 191 216 45 female 1.7018 66.738 32 38  
## 192 236 68 female 1.5494 54.026 29 37  
## 193 205 57 male 1.6764 77.634 37 40  
## 194 206 41 female 1.5748 83.536 39 44  
## 195 143 68 male 1.7018 71.732 37 43  
## 196 173 40 female NA 59.020 37 38  
## 197 235 79 female 1.6510 60.836 34 38  
## 198 169 62 male 1.6764 113.954 50 47  
## 199 283 63 female 1.5494 90.800 44 48  
## 200 174 55 male 1.7780 63.560 32 33  
## 201 271 55 female 1.6002 51.756 30 37  
## 202 203 27 female 1.7018 94.886 34 43  
## 203 188 66 male 1.7272 95.340 45 48  
## 204 293 63 female 1.6256 81.266 47 45  
## 205 215 78 male 1.6510 49.486 33 34  
## 206 207 68 male 1.3970 59.020 29 33  
## 207 179 31 male 1.6764 65.830 33 38  
## 208 202 64 female 1.5748 75.818 44 47  
## 209 211 40 female 1.7272 81.266 37 43  
## 210 211 61 female 1.6002 65.376 40 42  
## 211 151 28 male 1.7526 59.020 29 35  
## 212 171 34 female 1.6002 74.456 34 43  
## 213 342 63 female 1.6510 91.254 45 46  
## 214 179 55 male 1.9050 84.444 38 38  
## 215 155 26 male 1.8542 78.996 30 35  
## 216 197 36 female 1.6256 61.744 32 37  
## 217 200 40 female 1.5748 47.670 26 33  
## 218 237 45 male 1.7526 59.020 33 35  
## 219 198 68 female 1.6002 56.296 32 38  
## 220 240 82 female 1.6002 77.180 41 46  
## 221 192 60 female 1.5748 60.836 31 40  
## 222 145 30 female 1.6510 74.910 33 42  
## 223 269 41 male 1.7018 86.714 38 41  
## 224 240 54 female 1.6510 79.450 37 43  
## 225 205 72 female 1.5494 81.720 39 47  
## 226 266 47 male 1.7272 64.468 35 39  
## 227 188 50 female 1.5494 66.738 34 41  
## 228 222 51 female 1.6764 49.940 28 37  
## 229 142 45 male 1.7526 92.616 40 43  
## 230 268 38 female 1.6002 82.174 38 46  
## 231 174 20 male 1.7780 84.898 37 41  
## 232 214 44 female NA 86.260 38 44  
## 233 194 63 male 1.7780 82.174 37 42  
## 234 196 50 male 1.7018 63.560 35 37  
## 235 207 44 female 1.7018 91.254 46 49  
## 236 204 48 male 1.7272 88.984 38 42  
## 237 189 41 female 1.6002 69.462 32 40  
## 238 179 29 male 1.7272 77.180 38 39  
## 239 159 76 male 1.6764 85.352 40 41  
## 240 260 69 female 1.4986 81.266 45 48  
## 241 228 26 male 1.8288 117.586 48 49  
## 242 242 70 female 1.6764 90.800 41 47  
## 243 227 25 male 1.8034 73.548 35 39  
## 244 208 42 female 1.5748 64.014 33 40  
## 245 208 56 male 1.7272 83.082 36 39  
## 246 209 31 female 1.7018 72.640 30 44  
## 247 163 31 female 1.6510 54.480 29 40  
## 248 201 27 female 1.6510 65.830 32 35  
## 249 237 73 female 1.6256 78.996 38 44  
## 250 176 32 female 1.6002 114.408 45 58  
## 251 146 19 female 1.5240 61.290 33 40  
## 252 231 71 female 1.6002 70.370 33 41  
## 253 241 27 female 1.6002 81.266 40 42  
## 254 305 31 male 1.8034 95.794 40 45  
## 255 149 20 female 1.5748 52.210 31 37  
## 256 183 31 female 1.6764 86.260 41 47  
## 257 235 62 female 1.6002 131.660 55 62  
## 258 244 44 male 1.8034 76.272 36 39  
## 259 199 36 female 1.6764 115.770 47 52  
## 260 224 36 male 1.7526 93.070 37 41  
## 261 173 47 male 1.8542 118.040 42 47  
## 262 192 30 male 1.8288 113.500 43 51  
## 263 157 63 male 1.7526 75.364 39 38  
## 264 172 48 female 1.6002 77.180 35 42  
## 265 170 65 male 1.7526 82.628 42 39  
## 266 215 59 female 1.6002 79.904 34 44  
## 267 214 37 female 1.6256 65.830 34 42  
## 268 195 78 male 1.6764 78.088 40 40  
## 269 230 23 male 1.8034 125.758 50 49  
## 270 206 38 female 1.7526 75.818 36 47  
## 271 147 38 male 1.7526 93.070 39 41  
## 272 234 41 male 1.7018 83.082 38 40  
## 273 135 29 female 1.6510 55.842 26 37  
## 274 226 49 female 1.6002 58.112 31 36  
## 275 179 23 female 1.6510 83.082 43 45  
## 276 163 29 female 1.5748 44.946 30 36  
## 277 191 40 male 1.8288 122.580 45 49  
## 278 138 38 female 1.5240 62.652 31 39  
## 279 184 40 female 1.6002 129.390 50 60  
## 280 181 29 male 1.7272 81.720 38 42  
## 281 224 78 female 1.6002 72.640 36 45  
## 282 293 50 male 1.8034 77.180 34 39  
## 283 147 23 female 1.5494 83.990 43 47  
## 284 198 60 male 1.7780 74.002 36 40  
## 285 152 40 female 1.3208 84.898 38 49  
## 286 277 60 female 1.5494 58.112 33 39  
## 287 219 40 female 1.5748 69.462 36 44  
## 288 182 30 female 1.5748 56.750 31 39  
## 289 135 21 male 1.7526 70.370 31 39  
## 290 277 63 female 1.6256 101.242 45 54  
## 291 212 63 male 1.7780 73.094 37 40  
## 292 162 43 male 1.7018 98.064 41 44  
## 293 207 46 female 1.6002 81.266 38 46  
## 294 255 64 male 1.7272 103.058 44 47  
## 295 404 56 male 1.7526 72.186 38 39  
## 296 239 35 male 1.8796 77.180 32 38  
## 297 220 59 female 1.6764 62.652 32 38  
## 298 165 22 female 1.6002 51.756 28 35  
## 299 243 43 female 1.6256 108.506 48 53  
## 300 149 26 female 1.5748 78.996 38 46  
## 301 178 41 female 1.6510 85.352 35 46  
## 302 190 43 female 1.6510 89.892 40 49  
## 303 226 20 female 1.6256 51.756 31 39  
## 304 132 28 female 1.7272 102.150 41 52  
## 305 160 30 female 1.6002 64.922 33 40  
## 306 204 66 male 1.7018 66.284 36 48  
## 307 164 20 female 1.7780 64.014 32 39  
## 308 155 32 female 1.6510 68.554 33 40  
## 309 251 38 female 1.6256 112.592 49 58  
## 310 198 61 male 1.8796 69.008 33 38  
## 311 179 26 female 1.5240 59.020 32 40  
## 312 223 74 female 1.5748 74.910 41 46  
## 313 207 72 male 1.7780 81.720 39 40  
## 314 244 21 male 1.8034 74.002 34 39  
## 315 245 36 male 1.6764 81.266 37 42  
## 316 191 42 female 1.5494 70.824 36 42  
## 317 221 66 female 1.6256 59.020 31 38  
## 318 300 34 female NA 72.640 40 47  
## 319 173 43 female 1.7526 95.340 44 47  
## 320 138 57 male 1.8542 74.456 31 37  
## 321 203 45 male 1.6764 52.210 30 34  
## 322 260 44 female 1.5748 72.186 36 43  
## 323 166 27 male 1.8288 64.014 33 38  
## 324 180 63 male 1.7526 76.726 35 39  
## 325 159 65 male 1.7780 82.174 43 49  
## 326 207 30 male 1.8288 81.720 35 41  
## 327 298 28 male 1.6764 94.886 42 46  
## 328 203 41 male 1.8034 95.340 37 42  
## 329 191 31 female 1.5748 107.598 53 56  
## 330 231 33 male 1.7526 74.002 35 38  
## 331 184 66 male 1.8796 83.990 40 41  
## 332 164 28 female 1.7018 81.720 39 43  
## 333 134 25 female 1.6002 111.230 47 58  
## 334 220 26 male 1.7780 68.100 33 39  
## 335 180 40 female 1.6256 66.284 37 43  
## 336 216 38 male 1.7272 65.830 34 37  
## 337 158 30 female 1.5748 64.468 NA NA  
## 338 261 52 female 1.6256 89.892 42 49  
## 339 172 22 female 1.6256 67.192 35 38  
## 340 249 51 female 1.6510 90.800 43 46  
## 341 189 45 male 1.7526 86.260 39 44  
## 342 225 53 female 1.6002 82.628 38 46  
## 343 193 21 female 1.5494 99.880 40 52  
## 344 219 53 female 1.6256 81.266 39 47  
## 345 156 37 female 1.7018 96.248 48 51  
## 346 224 34 female 1.5240 74.910 34 46  
## 347 181 30 female 1.6764 116.678 47 55  
## 348 306 74 male 1.7526 83.536 39 41  
## 349 122 36 female 1.8034 83.082 41 45  
## 350 219 45 male 1.7018 98.972 41 45  
## 351 150 35 male 1.8542 81.266 32 37  
## 352 185 50 female 1.6256 103.512 42 54  
## 353 226 27 male 1.7526 131.206 48 51  
## 354 206 52 male 1.7526 69.462 36 40  
## 355 199 42 female 1.7018 106.690 47 52  
## 356 239 39 male 1.5240 65.376 33 42  
## 357 235 73 male 1.6510 83.082 43 46  
## 358 184 28 male 1.7018 69.916 35 38  
## 359 242 53 male 1.7526 98.064 43 45  
## 360 307 49 male 1.7018 82.174 41 42  
## 361 204 55 female 1.6764 91.708 43 47  
## 362 212 37 female 1.6256 72.640 37 45  
## 363 203 60 female 1.4986 55.842 36 41  
## 364 219 56 female 1.6510 89.438 41 50  
## 365 226 84 female 1.5240 87.168 41 48  
## 366 217 20 female 1.7018 84.898 40 45  
## 367 157 80 male 1.8034 96.248 47 48  
## 368 235 60 male 1.7526 84.444 40 42  
## 369 252 80 female 1.5748 73.548 44 41  
## 370 204 29 female 1.6256 54.480 33 38  
## 371 188 43 female 1.6764 69.008 37 41  
## 372 194 63 female 1.4732 95.340 44 53  
## 373 215 37 female 1.4986 67.192 32 42  
## 374 179 20 female 1.4732 77.180 34 46  
## 375 202 44 male 1.7272 71.278 33 37  
## 376 194 54 male 1.7526 58.566 30 37  
## 377 227 58 male 1.7780 95.794 38 43  
## 378 337 35 male 1.8288 85.806 36 44  
## 379 255 52 male 1.7780 54.480 30 33  
## 380 162 60 female 1.6002 54.934 32 34  
## 381 322 43 female 1.4224 54.480 32 41  
## 382 289 59 male 1.7272 76.726 36 38  
## 383 217 33 female 1.5748 84.444 42 46  
## 384 209 37 male 1.7780 118.948 42 48  
## 385 214 40 male 1.8288 100.788 40 44  
## 386 302 38 female 1.7018 100.788 41 51  
## 387 179 32 female 1.5748 81.266 37 47  
## 388 279 60 female 1.7272 101.696 48 50  
## 389 144 30 male 1.8288 74.910 31 38  
## 390 270 42 male 1.6764 83.990 39 41  
## 391 196 52 female 1.5748 66.738 34 42  
## 392 221 59 female 1.5748 80.358 39 45  
## 393 210 78 male 1.6764 65.830 38 39  
## 394 192 51 male 1.6510 66.284 NA NA  
## 395 169 25 female 1.5240 69.916 40 42  
## 396 179 37 male 1.6764 61.744 33 39  
## 397 216 54 female 1.6764 76.272 38 42  
## 398 301 89 female 1.5494 52.210 31 41  
## 399 296 53 male 1.7526 78.542 35 39  
## 400 284 51 female 1.6002 69.916 32 43  
## 401 194 29 female 1.7526 75.818 33 40  
## 402 199 41 female 1.6002 89.438 41 48  
## 403 159 68 female 1.6256 99.880 49 58

* Ahora usa esos valores de height y weight para añadir una nueva columna llamada BMI, definida mediante:
* (se divide por el cuadrado de la altura).

#Creación de la columna BMI a partir de peso y altura  
  
chlstrl=chlstrl %>%   
 mutate(BMI=weight/(height^2))  
  
(chlstrl)

## chol age gender height weight waist hip BMI  
## 1 203 46 female 1.5748 54.934 29 38 22.15085  
## 2 165 29 female 1.6256 98.972 46 48 37.45286  
## 3 228 58 female 1.5494 116.224 49 57 48.41375  
## 4 78 67 male 1.7018 54.026 33 38 18.65459  
## 5 249 64 male 1.7272 83.082 44 41 27.84977  
## 6 248 34 male 1.8034 86.260 36 42 26.52316  
## 7 195 30 male 1.7526 86.714 46 49 28.23083  
## 8 227 37 male 1.4986 77.180 34 39 34.36634  
## 9 177 45 male 1.7526 75.364 34 40 24.53569  
## 10 263 55 female 1.6002 91.708 45 50 35.81448  
## 11 242 60 female 1.6510 70.824 39 45 25.98282  
## 12 215 38 female 1.4732 88.530 42 50 40.79125  
## 13 238 27 female 1.5240 77.180 35 41 33.23034  
## 14 183 40 female 1.4986 74.910 37 43 33.35557  
## 15 191 36 male 1.7526 83.082 36 40 27.04838  
## 16 213 33 female 1.6510 71.278 37 41 26.14938  
## 17 255 50 female 1.6510 83.082 37 43 30.47985  
## 18 230 20 male 1.7018 72.186 31 39 24.92504  
## 19 194 36 male 1.6256 57.204 30 34 21.64706  
## 20 196 62 female 1.6510 88.984 46 51 32.64508  
## 21 186 70 male 1.7018 80.812 42 41 27.90351  
## 22 234 47 male 1.7018 104.420 45 46 36.05510  
## 23 203 38 female 1.7526 130.752 48 55 42.56795  
## 24 281 66 female 1.5748 83.990 48 44 33.86700  
## 25 228 24 female 1.5494 51.302 33 38 21.37013  
## 26 179 41 female 1.8288 53.572 28 36 16.01789  
## 27 232 37 male 1.7272 114.408 43 47 38.35051  
## 28 NA 48 male 1.7272 45.400 27 33 15.21846  
## 29 254 43 female 1.5748 65.830 31 38 26.54441  
## 30 215 40 male 1.7780 85.806 37 39 27.14277  
## 31 177 42 female 1.6510 78.996 37 40 28.98084  
## 32 182 52 male 1.7272 63.106 29 35 21.15365  
## 33 265 61 male 1.8796 86.714 39 41 24.54473  
## 34 182 61 female 1.7526 78.996 49 43 25.71814  
## 35 199 25 male 1.6764 53.572 32 34 19.06262  
## 36 183 47 female 1.6764 84.444 39 44 30.04786  
## 37 194 35 male 1.6764 72.186 31 35 25.68607  
## 38 190 46 male 1.8288 93.070 46 49 27.82770  
## 39 173 57 male 1.8034 65.830 31 36 20.24136  
## 40 182 70 male 1.7526 97.156 45 48 31.63035  
## 41 136 22 female 1.6764 72.640 35 40 25.84762  
## 42 218 52 female 1.5748 77.180 40 43 31.12103  
## 43 225 36 male 1.7018 87.168 40 42 30.09817  
## 44 262 43 male 1.9050 114.862 43 49 31.65093  
## 45 213 72 female 1.4986 62.198 40 40 27.69523  
## 46 243 37 female 1.6256 105.782 49 57 40.02989  
## 47 148 54 female 1.7018 74.910 42 42 25.86561  
## 48 128 60 male 1.7018 88.984 42 43 30.72521  
## 49 169 40 female 1.6510 81.720 40 44 29.98018  
## 50 157 55 female 1.6764 99.426 43 52 35.37893  
## 51 196 76 male 1.6510 69.916 37 41 25.64971  
## 52 237 43 female 1.6256 82.174 36 46 31.09618  
## 53 212 65 female 1.5494 84.898 43 47 35.36473  
## 54 233 45 female 1.6256 75.818 39 44 28.69095  
## 55 289 70 female 1.5240 99.880 51 54 43.00397  
## 56 193 20 female 1.7272 124.396 49 58 41.69857  
## 57 204 62 male 1.7272 81.720 38 41 27.39322  
## 58 165 92 female 1.5748 98.518 51 51 39.72508  
## 59 237 49 female 1.5748 85.806 43 47 34.59926  
## 60 218 44 female 1.6764 86.714 40 45 30.85559  
## 61 296 74 female 1.6002 83.082 42 48 32.44579  
## 62 178 36 male 1.7780 73.094 34 40 23.12162  
## 63 443 51 female 1.7780 106.690 43 48 33.74895  
## 64 145 38 female NA 56.750 31 35 NA  
## 65 234 31 male 1.7780 74.910 35 39 23.69607  
## 66 146 28 female 1.6256 57.204 28 32 21.64706  
## 67 223 22 female 1.5748 62.198 28 35 25.07989  
## 68 213 71 female 1.6002 74.910 34 42 29.25440  
## 69 173 76 female 1.5494 46.308 31 33 19.28985  
## 70 232 91 female 1.5494 57.658 35 38 24.01776  
## 71 171 40 male 1.8034 97.156 41 39 29.87346  
## 72 164 23 female 1.7526 111.230 44 47 36.21232  
## 73 170 20 female 1.6256 73.094 37 40 27.66014  
## 74 180 40 female 1.7272 119.856 43 54 40.17672  
## 75 204 52 male 1.9050 64.468 31 35 17.76455  
## 76 209 76 female 1.5240 64.922 35 40 27.95258  
## 77 242 46 female 1.5748 83.082 37 45 33.50087  
## 78 134 48 male 1.7780 78.542 36 40 24.84497  
## 79 217 22 female 1.8034 101.242 46 50 31.12982  
## 80 251 58 female 1.6002 69.916 38 41 27.30411  
## 81 217 34 male 1.8542 99.426 41 42 28.91924  
## 82 300 61 female 1.7018 76.726 40 44 26.49266  
## 83 218 40 male 1.8542 90.800 38 41 26.41026  
## 84 189 28 female 1.6256 90.800 38 45 34.36042  
## 85 185 53 female 1.5494 65.830 37 40 27.42185  
## 86 206 67 male 1.7018 80.812 37 41 27.90351  
## 87 218 51 female NA 97.610 42 53 NA  
## 88 189 49 female 1.5748 93.070 40 49 37.52830  
## 89 229 65 female 1.5748 68.554 37 42 27.64280  
## 90 228 54 male 1.6764 77.180 36 41 27.46309  
## 91 159 38 male 1.7272 76.726 34 40 25.71919  
## 92 249 64 female 1.6002 72.186 33 41 28.19061  
## 93 170 41 female 1.5494 49.940 29 30 20.80278  
## 94 174 67 male 1.7272 89.892 36 43 30.13254  
## 95 204 27 female 1.7018 83.990 35 44 29.00084  
## 96 203 21 female 1.6002 64.468 28 39 25.17652  
## 97 241 41 female 1.4986 63.106 29 39 28.09954  
## 98 245 47 female 1.6002 70.824 35 39 27.65871  
## 99 143 61 female 1.6510 99.880 40 50 36.64244  
## 100 224 65 male 1.7018 89.438 42 43 30.88197  
## 101 168 28 female 1.6002 90.800 42 46 35.45988  
## 102 184 41 male 1.7526 69.916 34 39 22.76203  
## 103 199 37 female 1.5494 92.162 42 51 38.39059  
## 104 158 50 male 1.8034 81.720 36 40 25.12721  
## 105 209 57 female 1.5494 68.100 36 39 28.36743  
## 106 214 28 male 1.7272 92.616 40 41 31.04565  
## 107 293 31 female 1.7018 90.800 41 42 31.35226  
## 108 227 83 female 1.4986 56.750 35 40 25.26937  
## 109 292 79 male 1.7780 74.910 39 41 23.69607  
## 110 218 68 male 1.7780 77.180 37 42 24.41413  
## 111 244 32 male 1.7780 96.248 39 44 30.44586  
## 112 283 26 male 1.8288 103.058 41 44 30.81409  
## 113 186 36 male 1.7526 68.100 31 38 22.17081  
## 114 273 53 female 1.6256 78.996 34 43 29.89357  
## 115 193 19 female 1.5494 54.026 32 38 22.50483  
## 116 194 63 male 1.8542 79.450 34 39 23.10898  
## 117 231 58 female 1.6002 104.420 39 48 40.77887  
## 118 217 53 female 1.6002 71.732 33 40 28.01331  
## 119 174 50 male 1.7780 119.402 51 64 37.77010  
## 120 225 41 male 1.8034 70.824 31 40 21.77691  
## 121 268 48 male 1.7780 54.480 32 35 17.23350  
## 122 195 59 female 1.7018 78.088 38 43 26.96294  
## 123 179 34 male 1.8288 77.180 31 39 23.07663  
## 124 215 63 female 1.6002 71.732 34 42 28.01331  
## 125 185 23 male 1.9304 74.456 32 40 19.98044  
## 126 132 21 female 1.6510 76.726 39 43 28.14806  
## 127 175 23 female 1.6510 106.690 44 50 39.14079  
## 128 179 36 female 1.6002 56.750 33 36 22.16243  
## 129 228 71 female 1.6002 110.776 48 51 43.26106  
## 130 181 64 male 1.8034 102.150 44 47 31.40901  
## 131 160 43 female 1.6256 63.560 37 40 24.05229  
## 132 188 31 female 1.7018 103.058 47 53 35.58481  
## 133 168 44 female 1.6256 72.640 40 43 27.48834  
## 134 318 60 female 1.6510 75.818 38 44 27.81494  
## 135 192 43 female 1.6256 147.550 53 62 55.83568  
## 136 209 48 female 1.6002 54.934 32 38 21.45323  
## 137 129 56 male 1.8796 68.554 34 38 19.40448  
## 138 160 55 female 1.7018 101.242 43 48 34.95777  
## 139 160 49 male 1.8034 120.764 49 45 37.13243  
## 140 211 58 male 1.7018 80.358 38 43 27.74675  
## 141 262 33 female 1.6002 77.180 33 46 30.14090  
## 142 201 48 female 1.7272 66.284 32 41 22.21895  
## 143 263 66 female 1.6764 54.934 31 33 19.54726  
## 144 219 59 male 1.6764 77.180 37 40 27.46309  
## 145 191 45 female 1.7018 68.554 33 38 23.67095  
## 146 171 52 male 1.8034 72.186 33 39 22.19570  
## 147 219 76 male 1.6256 47.670 29 33 18.03922  
## 148 347 36 male 1.7780 125.758 51 49 39.78067  
## 149 269 41 female 1.5748 72.640 39 41 29.29038  
## 150 164 20 male 1.8288 65.830 29 36 19.68301  
## 151 181 50 male 1.8034 145.280 56 49 44.67059  
## 152 190 43 female 1.5748 74.002 40 45 29.83958  
## 153 255 82 male 1.6764 74.002 37 43 26.33226  
## 154 218 35 male 1.7526 76.726 39 41 24.97911  
## 155 223 47 female 1.6510 105.328 46 54 38.64112  
## 156 254 75 male 1.7272 95.340 44 45 31.95876  
## 157 236 62 male 1.9304 72.640 35 39 19.49311  
## 158 176 31 female 1.5748 65.830 36 42 26.54441  
## 159 158 50 male 1.7780 97.610 40 45 30.87669  
## 160 181 39 female 1.6764 115.770 46 54 41.19464  
## 161 151 33 male 1.7526 139.832 52 58 45.52406  
## 162 115 58 male 1.7526 NA 30 37 NA  
## 163 271 81 female 1.6256 71.732 36 43 27.14473  
## 164 190 27 female 1.6510 95.340 39 47 34.97687  
## 165 118 47 female 1.6256 55.842 30 36 21.13166  
## 166 168 33 female 1.6764 53.572 29 35 19.06262  
## 167 254 67 male 1.7272 75.818 36 39 25.41482  
## 168 193 42 female 1.9050 84.444 37 46 23.26906  
## 169 187 21 female 1.6002 71.732 39 43 28.01331  
## 170 212 51 female 1.6510 65.830 38 42 24.15070  
## 171 170 27 female 1.6002 54.026 28 37 21.09863  
## 172 215 51 female 1.7018 128.028 52 59 44.20668  
## 173 199 71 male 1.7526 77.634 38 40 25.27472  
## 174 140 50 male 1.7526 78.088 37 41 25.42253  
## 175 216 54 female 1.6510 62.652 33 39 22.98480  
## 176 204 59 male 1.8542 84.898 38 37 24.69359  
## 177 193 59 female 1.6764 85.806 38 45 30.53250  
## 178 267 40 female 1.4986 92.616 40 47 41.23961  
## 179 201 58 male 1.6764 97.610 46 44 34.73274  
## 180 204 72 male 1.6510 75.818 45 46 27.81494  
## 181 246 66 female 1.6764 85.806 45 46 30.53250  
## 182 229 23 male 1.8288 81.720 34 41 24.43408  
## 183 172 42 female 1.6510 74.910 33 45 27.48183  
## 184 197 43 male 1.8034 81.266 37 44 24.98761  
## 185 205 75 male 1.7526 92.616 44 42 30.15230  
## 186 219 65 female 1.6002 105.782 40 53 41.31077  
## 187 174 34 male 1.8034 95.340 37 43 29.31508  
## 188 192 37 male 1.8034 88.530 36 43 27.22114  
## 189 206 61 female 1.6002 90.346 41 47 35.28259  
## 190 160 36 female 1.6256 83.990 39 45 31.78339  
## 191 216 45 female 1.7018 66.738 32 38 23.04391  
## 192 236 68 female 1.5494 54.026 29 37 22.50483  
## 193 205 57 male 1.6764 77.634 37 40 27.62464  
## 194 206 41 female 1.5748 83.536 39 44 33.68394  
## 195 143 68 male 1.7018 71.732 37 43 24.76828  
## 196 173 40 female NA 59.020 37 38 NA  
## 197 235 79 female 1.6510 60.836 34 38 22.31858  
## 198 169 62 male 1.6764 113.954 50 47 40.54845  
## 199 283 63 female 1.5494 90.800 44 48 37.82324  
## 200 174 55 male 1.7780 63.560 32 33 20.10575  
## 201 271 55 female 1.6002 51.756 30 37 20.21213  
## 202 203 27 female 1.7018 94.886 34 43 32.76311  
## 203 188 66 male 1.7272 95.340 45 48 31.95876  
## 204 293 63 female 1.6256 81.266 47 45 30.75258  
## 205 215 78 male 1.6510 49.486 33 34 18.15466  
## 206 207 68 male 1.3970 59.020 29 33 30.24171  
## 207 179 31 male 1.6764 65.830 33 38 23.42440  
## 208 202 64 female 1.5748 75.818 44 47 30.57184  
## 209 211 40 female 1.7272 81.266 37 43 27.24104  
## 210 211 61 female 1.6002 65.376 40 42 25.53112  
## 211 151 28 male 1.7526 59.020 29 35 19.21470  
## 212 171 34 female 1.6002 74.456 34 43 29.07711  
## 213 342 63 female 1.6510 91.254 45 46 33.47787  
## 214 179 55 male 1.9050 84.444 38 38 23.26906  
## 215 155 26 male 1.8542 78.996 30 35 22.97693  
## 216 197 36 female 1.6256 61.744 32 37 23.36509  
## 217 200 40 female 1.5748 47.670 26 33 19.22181  
## 218 237 45 male 1.7526 59.020 33 35 19.21470  
## 219 198 68 female 1.6002 56.296 32 38 21.98513  
## 220 240 82 female 1.6002 77.180 41 46 30.14090  
## 221 192 60 female 1.5748 60.836 31 40 24.53069  
## 222 145 30 female 1.6510 74.910 33 42 27.48183  
## 223 269 41 male 1.7018 86.714 38 41 29.94141  
## 224 240 54 female 1.6510 79.450 37 43 29.14740  
## 225 205 72 female 1.5494 81.720 39 47 34.04092  
## 226 266 47 male 1.7272 64.468 35 39 21.61021  
## 227 188 50 female 1.5494 66.738 34 41 27.80008  
## 228 222 51 female 1.6764 49.940 28 37 17.77024  
## 229 142 45 male 1.7526 92.616 40 43 30.15230  
## 230 268 38 female 1.6002 82.174 38 46 32.09120  
## 231 174 20 male 1.7780 84.898 37 41 26.85554  
## 232 214 44 female NA 86.260 38 44 NA  
## 233 194 63 male 1.7780 82.174 37 42 25.99387  
## 234 196 50 male 1.7018 63.560 35 37 21.94658  
## 235 207 44 female 1.7018 91.254 46 49 31.50902  
## 236 204 48 male 1.7272 88.984 38 42 29.82817  
## 237 189 41 female 1.6002 69.462 32 40 27.12681  
## 238 179 29 male 1.7272 77.180 38 39 25.87138  
## 239 159 76 male 1.6764 85.352 40 41 30.37095  
## 240 260 69 female 1.4986 81.266 45 48 36.18574  
## 241 228 26 male 1.8288 117.586 48 49 35.15792  
## 242 242 70 female 1.6764 90.800 41 47 32.30952  
## 243 227 25 male 1.8034 73.548 35 39 22.61449  
## 244 208 42 female 1.5748 64.014 33 40 25.81215  
## 245 208 56 male 1.7272 83.082 36 39 27.84977  
## 246 209 31 female 1.7018 72.640 30 44 25.08181  
## 247 163 31 female 1.6510 54.480 29 40 19.98679  
## 248 201 27 female 1.6510 65.830 32 35 24.15070  
## 249 237 73 female 1.6256 78.996 38 44 29.89357  
## 250 176 32 female 1.6002 114.408 45 58 44.67945  
## 251 146 19 female 1.5240 61.290 33 40 26.38880  
## 252 231 71 female 1.6002 70.370 33 41 27.48141  
## 253 241 27 female 1.6002 81.266 40 42 31.73660  
## 254 305 31 male 1.8034 95.794 40 45 29.45467  
## 255 149 20 female 1.5748 52.210 31 37 21.05246  
## 256 183 31 female 1.6764 86.260 41 47 30.69405  
## 257 235 62 female 1.6002 131.660 55 62 51.41683  
## 258 244 44 male 1.8034 76.272 36 39 23.45206  
## 259 199 36 female 1.6764 115.770 47 52 41.19464  
## 260 224 36 male 1.7526 93.070 37 41 30.30010  
## 261 173 47 male 1.8542 118.040 42 47 34.33334  
## 262 192 30 male 1.8288 113.500 43 51 33.93622  
## 263 157 63 male 1.7526 75.364 39 38 24.53569  
## 264 172 48 female 1.6002 77.180 35 42 30.14090  
## 265 170 65 male 1.7526 82.628 42 39 26.90058  
## 266 215 59 female 1.6002 79.904 34 44 31.20470  
## 267 214 37 female 1.6256 65.830 34 42 24.91130  
## 268 195 78 male 1.6764 78.088 40 40 27.78619  
## 269 230 23 male 1.8034 125.758 50 49 38.66798  
## 270 206 38 female 1.7526 75.818 36 47 24.68350  
## 271 147 38 male 1.7526 93.070 39 41 30.30010  
## 272 234 41 male 1.7018 83.082 38 40 28.68732  
## 273 135 29 female 1.6510 55.842 26 37 20.48646  
## 274 226 49 female 1.6002 58.112 31 36 22.69433  
## 275 179 23 female 1.6510 83.082 43 45 30.47985  
## 276 163 29 female 1.5748 44.946 30 36 18.12342  
## 277 191 40 male 1.8288 122.580 45 49 36.65111  
## 278 138 38 female 1.5240 62.652 31 39 26.97522  
## 279 184 40 female 1.6002 129.390 50 60 50.53034  
## 280 181 29 male 1.7272 81.720 38 42 27.39322  
## 281 224 78 female 1.6002 72.640 36 45 28.36791  
## 282 293 50 male 1.8034 77.180 34 39 23.73125  
## 283 147 23 female 1.5494 83.990 43 47 34.98650  
## 284 198 60 male 1.7780 74.002 36 40 23.40884  
## 285 152 40 female 1.3208 84.898 38 49 48.66574  
## 286 277 60 female 1.5494 58.112 33 39 24.20687  
## 287 219 40 female 1.5748 69.462 36 44 28.00893  
## 288 182 30 female 1.5748 56.750 31 39 22.88311  
## 289 135 21 male 1.7526 70.370 31 39 22.90983  
## 290 277 63 female 1.6256 101.242 45 54 38.31187  
## 291 212 63 male 1.7780 73.094 37 40 23.12162  
## 292 162 43 male 1.7018 98.064 41 44 33.86044  
## 293 207 46 female 1.6002 81.266 38 46 31.73660  
## 294 255 64 male 1.7272 103.058 44 47 34.54590  
## 295 404 56 male 1.7526 72.186 38 39 23.50106  
## 296 239 35 male 1.8796 77.180 32 38 21.84610  
## 297 220 59 female 1.6764 62.652 32 38 22.29357  
## 298 165 22 female 1.6002 51.756 28 35 20.21213  
## 299 243 43 female 1.6256 108.506 48 53 41.06070  
## 300 149 26 female 1.5748 78.996 38 46 31.85329  
## 301 178 41 female 1.6510 85.352 35 46 31.31263  
## 302 190 43 female 1.6510 89.892 40 49 32.97820  
## 303 226 20 female 1.6256 51.756 31 39 19.58544  
## 304 132 28 female 1.7272 102.150 41 52 34.24153  
## 305 160 30 female 1.6002 64.922 33 40 25.35382  
## 306 204 66 male 1.7018 66.284 36 48 22.88715  
## 307 164 20 female 1.7780 64.014 32 39 20.24937  
## 308 155 32 female 1.6510 68.554 33 40 25.15004  
## 309 251 38 female 1.6256 112.592 49 58 42.60692  
## 310 198 61 male 1.8796 69.008 33 38 19.53298  
## 311 179 26 female 1.5240 59.020 32 40 25.41144  
## 312 223 74 female 1.5748 74.910 41 46 30.20571  
## 313 207 72 male 1.7780 81.720 39 40 25.85026  
## 314 244 21 male 1.8034 74.002 34 39 22.75408  
## 315 245 36 male 1.6764 81.266 37 42 28.91702  
## 316 191 42 female 1.5494 70.824 36 42 29.50213  
## 317 221 66 female 1.6256 59.020 31 38 22.33427  
## 318 300 34 female NA 72.640 40 47 NA  
## 319 173 43 female 1.7526 95.340 44 47 31.03913  
## 320 138 57 male 1.8542 74.456 31 37 21.65641  
## 321 203 45 male 1.6764 52.210 30 34 18.57798  
## 322 260 44 female 1.5748 72.186 36 43 29.10732  
## 323 166 27 male 1.8288 64.014 33 38 19.14003  
## 324 180 63 male 1.7526 76.726 35 39 24.97911  
## 325 159 65 male 1.7780 82.174 43 49 25.99387  
## 326 207 30 male 1.8288 81.720 35 41 24.43408  
## 327 298 28 male 1.6764 94.886 42 46 33.76345  
## 328 203 41 male 1.8034 95.340 37 42 29.31508  
## 329 191 31 female 1.5748 107.598 53 56 43.38638  
## 330 231 33 male 1.7526 74.002 35 38 24.09228  
## 331 184 66 male 1.8796 83.990 40 41 23.77370  
## 332 164 28 female 1.7018 81.720 39 43 28.21703  
## 333 134 25 female 1.6002 111.230 47 58 43.43836  
## 334 220 26 male 1.7780 68.100 33 39 21.54188  
## 335 180 40 female 1.6256 66.284 37 43 25.08311  
## 336 216 38 male 1.7272 65.830 34 37 22.06676  
## 337 158 30 female 1.5748 64.468 NA NA 25.99521  
## 338 261 52 female 1.6256 89.892 42 49 34.01682  
## 339 172 22 female 1.6256 67.192 35 38 25.42671  
## 340 249 51 female 1.6510 90.800 43 46 33.31131  
## 341 189 45 male 1.7526 86.260 39 44 28.08302  
## 342 225 53 female 1.6002 82.628 38 46 32.26849  
## 343 193 21 female 1.5494 99.880 40 52 41.60557  
## 344 219 53 female 1.6256 81.266 39 47 30.75258  
## 345 156 37 female 1.7018 96.248 48 51 33.23339  
## 346 224 34 female 1.5240 74.910 34 46 32.25298  
## 347 181 30 female 1.6764 116.678 47 55 41.51774  
## 348 306 74 male 1.7526 83.536 39 41 27.19619  
## 349 122 36 female 1.8034 83.082 41 45 25.54599  
## 350 219 45 male 1.7018 98.972 41 45 34.17396  
## 351 150 35 male 1.8542 81.266 32 37 23.63718  
## 352 185 50 female 1.6256 103.512 42 54 39.17088  
## 353 226 27 male 1.7526 131.206 48 51 42.71575  
## 354 206 52 male 1.7526 69.462 36 40 22.61422  
## 355 199 42 female 1.7018 106.690 47 52 36.83890  
## 356 239 39 male 1.5240 65.376 33 42 28.14806  
## 357 235 73 male 1.6510 83.082 43 46 30.47985  
## 358 184 28 male 1.7018 69.916 35 38 24.14124  
## 359 242 53 male 1.7526 98.064 43 45 31.92596  
## 360 307 49 male 1.7018 82.174 41 42 28.37379  
## 361 204 55 female 1.6764 91.708 43 47 32.63262  
## 362 212 37 female 1.6256 72.640 37 45 27.48834  
## 363 203 60 female 1.4986 55.842 36 41 24.86506  
## 364 219 56 female 1.6510 89.438 41 50 32.81164  
## 365 226 84 female 1.5240 87.168 41 48 37.53074  
## 366 217 20 female 1.7018 84.898 40 45 29.31436  
## 367 157 80 male 1.8034 96.248 47 48 29.59427  
## 368 235 60 male 1.7526 84.444 40 42 27.49180  
## 369 252 80 female 1.5748 73.548 44 41 29.65651  
## 370 204 29 female 1.6256 54.480 33 38 20.61625  
## 371 188 43 female 1.6764 69.008 37 41 24.55524  
## 372 194 63 female 1.4732 95.340 44 53 43.92904  
## 373 215 37 female 1.4986 67.192 32 42 29.91893  
## 374 179 20 female 1.4732 77.180 34 46 35.56161  
## 375 202 44 male 1.7272 71.278 33 37 23.89298  
## 376 194 54 male 1.7526 58.566 30 37 19.06689  
## 377 227 58 male 1.7780 95.794 38 43 30.30224  
## 378 337 35 male 1.8288 85.806 36 44 25.65578  
## 379 255 52 male 1.7780 54.480 30 33 17.23350  
## 380 162 60 female 1.6002 54.934 32 34 21.45323  
## 381 322 43 female 1.4224 54.480 32 41 26.92735  
## 382 289 59 male 1.7272 76.726 36 38 25.71919  
## 383 217 33 female 1.5748 84.444 42 46 34.05007  
## 384 209 37 male 1.7780 118.948 42 48 37.62648  
## 385 214 40 male 1.8288 100.788 40 44 30.13536  
## 386 302 38 female 1.7018 100.788 41 51 34.80101  
## 387 179 32 female 1.5748 81.266 37 47 32.76861  
## 388 279 60 female 1.7272 101.696 48 50 34.08934  
## 389 144 30 male 1.8288 74.910 31 38 22.39790  
## 390 270 42 male 1.6764 83.990 39 41 29.88631  
## 391 196 52 female 1.5748 66.738 34 42 26.91054  
## 392 221 59 female 1.5748 80.358 39 45 32.40248  
## 393 210 78 male 1.6764 65.830 38 39 23.42440  
## 394 192 51 male 1.6510 66.284 NA NA 24.31726  
## 395 169 25 female 1.5240 69.916 40 42 30.10278  
## 396 179 37 male 1.6764 61.744 33 39 21.97048  
## 397 216 54 female 1.6764 76.272 38 42 27.14000  
## 398 301 89 female 1.5494 52.210 31 41 21.74836  
## 399 296 53 male 1.7526 78.542 35 39 25.57033  
## 400 284 51 female 1.6002 69.916 32 43 27.30411  
## 401 194 29 female 1.7526 75.818 33 40 24.68350  
## 402 199 41 female 1.6002 89.438 41 48 34.92799  
## 403 159 68 female 1.6256 99.880 49 58 37.79646

* Crea una nueva columna llamada ageGroup dividiendo la edad en los siguientes tres niveles:
* (10,40], (40,70], (70,100]

#Clasificación de todas las filas como parte de un grupo de edad determinado en forma de nueva columna  
  
(chlstrl=chlstrl %>%   
 mutate(ageGroup=cut(age,breaks=c(10,40,70,100))))

## chol age gender height weight waist hip BMI ageGroup  
## 1 203 46 female 1.5748 54.934 29 38 22.15085 (40,70]  
## 2 165 29 female 1.6256 98.972 46 48 37.45286 (10,40]  
## 3 228 58 female 1.5494 116.224 49 57 48.41375 (40,70]  
## 4 78 67 male 1.7018 54.026 33 38 18.65459 (40,70]  
## 5 249 64 male 1.7272 83.082 44 41 27.84977 (40,70]  
## 6 248 34 male 1.8034 86.260 36 42 26.52316 (10,40]  
## 7 195 30 male 1.7526 86.714 46 49 28.23083 (10,40]  
## 8 227 37 male 1.4986 77.180 34 39 34.36634 (10,40]  
## 9 177 45 male 1.7526 75.364 34 40 24.53569 (40,70]  
## 10 263 55 female 1.6002 91.708 45 50 35.81448 (40,70]  
## 11 242 60 female 1.6510 70.824 39 45 25.98282 (40,70]  
## 12 215 38 female 1.4732 88.530 42 50 40.79125 (10,40]  
## 13 238 27 female 1.5240 77.180 35 41 33.23034 (10,40]  
## 14 183 40 female 1.4986 74.910 37 43 33.35557 (10,40]  
## 15 191 36 male 1.7526 83.082 36 40 27.04838 (10,40]  
## 16 213 33 female 1.6510 71.278 37 41 26.14938 (10,40]  
## 17 255 50 female 1.6510 83.082 37 43 30.47985 (40,70]  
## 18 230 20 male 1.7018 72.186 31 39 24.92504 (10,40]  
## 19 194 36 male 1.6256 57.204 30 34 21.64706 (10,40]  
## 20 196 62 female 1.6510 88.984 46 51 32.64508 (40,70]  
## 21 186 70 male 1.7018 80.812 42 41 27.90351 (40,70]  
## 22 234 47 male 1.7018 104.420 45 46 36.05510 (40,70]  
## 23 203 38 female 1.7526 130.752 48 55 42.56795 (10,40]  
## 24 281 66 female 1.5748 83.990 48 44 33.86700 (40,70]  
## 25 228 24 female 1.5494 51.302 33 38 21.37013 (10,40]  
## 26 179 41 female 1.8288 53.572 28 36 16.01789 (40,70]  
## 27 232 37 male 1.7272 114.408 43 47 38.35051 (10,40]  
## 28 NA 48 male 1.7272 45.400 27 33 15.21846 (40,70]  
## 29 254 43 female 1.5748 65.830 31 38 26.54441 (40,70]  
## 30 215 40 male 1.7780 85.806 37 39 27.14277 (10,40]  
## 31 177 42 female 1.6510 78.996 37 40 28.98084 (40,70]  
## 32 182 52 male 1.7272 63.106 29 35 21.15365 (40,70]  
## 33 265 61 male 1.8796 86.714 39 41 24.54473 (40,70]  
## 34 182 61 female 1.7526 78.996 49 43 25.71814 (40,70]  
## 35 199 25 male 1.6764 53.572 32 34 19.06262 (10,40]  
## 36 183 47 female 1.6764 84.444 39 44 30.04786 (40,70]  
## 37 194 35 male 1.6764 72.186 31 35 25.68607 (10,40]  
## 38 190 46 male 1.8288 93.070 46 49 27.82770 (40,70]  
## 39 173 57 male 1.8034 65.830 31 36 20.24136 (40,70]  
## 40 182 70 male 1.7526 97.156 45 48 31.63035 (40,70]  
## 41 136 22 female 1.6764 72.640 35 40 25.84762 (10,40]  
## 42 218 52 female 1.5748 77.180 40 43 31.12103 (40,70]  
## 43 225 36 male 1.7018 87.168 40 42 30.09817 (10,40]  
## 44 262 43 male 1.9050 114.862 43 49 31.65093 (40,70]  
## 45 213 72 female 1.4986 62.198 40 40 27.69523 (70,100]  
## 46 243 37 female 1.6256 105.782 49 57 40.02989 (10,40]  
## 47 148 54 female 1.7018 74.910 42 42 25.86561 (40,70]  
## 48 128 60 male 1.7018 88.984 42 43 30.72521 (40,70]  
## 49 169 40 female 1.6510 81.720 40 44 29.98018 (10,40]  
## 50 157 55 female 1.6764 99.426 43 52 35.37893 (40,70]  
## 51 196 76 male 1.6510 69.916 37 41 25.64971 (70,100]  
## 52 237 43 female 1.6256 82.174 36 46 31.09618 (40,70]  
## 53 212 65 female 1.5494 84.898 43 47 35.36473 (40,70]  
## 54 233 45 female 1.6256 75.818 39 44 28.69095 (40,70]  
## 55 289 70 female 1.5240 99.880 51 54 43.00397 (40,70]  
## 56 193 20 female 1.7272 124.396 49 58 41.69857 (10,40]  
## 57 204 62 male 1.7272 81.720 38 41 27.39322 (40,70]  
## 58 165 92 female 1.5748 98.518 51 51 39.72508 (70,100]  
## 59 237 49 female 1.5748 85.806 43 47 34.59926 (40,70]  
## 60 218 44 female 1.6764 86.714 40 45 30.85559 (40,70]  
## 61 296 74 female 1.6002 83.082 42 48 32.44579 (70,100]  
## 62 178 36 male 1.7780 73.094 34 40 23.12162 (10,40]  
## 63 443 51 female 1.7780 106.690 43 48 33.74895 (40,70]  
## 64 145 38 female NA 56.750 31 35 NA (10,40]  
## 65 234 31 male 1.7780 74.910 35 39 23.69607 (10,40]  
## 66 146 28 female 1.6256 57.204 28 32 21.64706 (10,40]  
## 67 223 22 female 1.5748 62.198 28 35 25.07989 (10,40]  
## 68 213 71 female 1.6002 74.910 34 42 29.25440 (70,100]  
## 69 173 76 female 1.5494 46.308 31 33 19.28985 (70,100]  
## 70 232 91 female 1.5494 57.658 35 38 24.01776 (70,100]  
## 71 171 40 male 1.8034 97.156 41 39 29.87346 (10,40]  
## 72 164 23 female 1.7526 111.230 44 47 36.21232 (10,40]  
## 73 170 20 female 1.6256 73.094 37 40 27.66014 (10,40]  
## 74 180 40 female 1.7272 119.856 43 54 40.17672 (10,40]  
## 75 204 52 male 1.9050 64.468 31 35 17.76455 (40,70]  
## 76 209 76 female 1.5240 64.922 35 40 27.95258 (70,100]  
## 77 242 46 female 1.5748 83.082 37 45 33.50087 (40,70]  
## 78 134 48 male 1.7780 78.542 36 40 24.84497 (40,70]  
## 79 217 22 female 1.8034 101.242 46 50 31.12982 (10,40]  
## 80 251 58 female 1.6002 69.916 38 41 27.30411 (40,70]  
## 81 217 34 male 1.8542 99.426 41 42 28.91924 (10,40]  
## 82 300 61 female 1.7018 76.726 40 44 26.49266 (40,70]  
## 83 218 40 male 1.8542 90.800 38 41 26.41026 (10,40]  
## 84 189 28 female 1.6256 90.800 38 45 34.36042 (10,40]  
## 85 185 53 female 1.5494 65.830 37 40 27.42185 (40,70]  
## 86 206 67 male 1.7018 80.812 37 41 27.90351 (40,70]  
## 87 218 51 female NA 97.610 42 53 NA (40,70]  
## 88 189 49 female 1.5748 93.070 40 49 37.52830 (40,70]  
## 89 229 65 female 1.5748 68.554 37 42 27.64280 (40,70]  
## 90 228 54 male 1.6764 77.180 36 41 27.46309 (40,70]  
## 91 159 38 male 1.7272 76.726 34 40 25.71919 (10,40]  
## 92 249 64 female 1.6002 72.186 33 41 28.19061 (40,70]  
## 93 170 41 female 1.5494 49.940 29 30 20.80278 (40,70]  
## 94 174 67 male 1.7272 89.892 36 43 30.13254 (40,70]  
## 95 204 27 female 1.7018 83.990 35 44 29.00084 (10,40]  
## 96 203 21 female 1.6002 64.468 28 39 25.17652 (10,40]  
## 97 241 41 female 1.4986 63.106 29 39 28.09954 (40,70]  
## 98 245 47 female 1.6002 70.824 35 39 27.65871 (40,70]  
## 99 143 61 female 1.6510 99.880 40 50 36.64244 (40,70]  
## 100 224 65 male 1.7018 89.438 42 43 30.88197 (40,70]  
## 101 168 28 female 1.6002 90.800 42 46 35.45988 (10,40]  
## 102 184 41 male 1.7526 69.916 34 39 22.76203 (40,70]  
## 103 199 37 female 1.5494 92.162 42 51 38.39059 (10,40]  
## 104 158 50 male 1.8034 81.720 36 40 25.12721 (40,70]  
## 105 209 57 female 1.5494 68.100 36 39 28.36743 (40,70]  
## 106 214 28 male 1.7272 92.616 40 41 31.04565 (10,40]  
## 107 293 31 female 1.7018 90.800 41 42 31.35226 (10,40]  
## 108 227 83 female 1.4986 56.750 35 40 25.26937 (70,100]  
## 109 292 79 male 1.7780 74.910 39 41 23.69607 (70,100]  
## 110 218 68 male 1.7780 77.180 37 42 24.41413 (40,70]  
## 111 244 32 male 1.7780 96.248 39 44 30.44586 (10,40]  
## 112 283 26 male 1.8288 103.058 41 44 30.81409 (10,40]  
## 113 186 36 male 1.7526 68.100 31 38 22.17081 (10,40]  
## 114 273 53 female 1.6256 78.996 34 43 29.89357 (40,70]  
## 115 193 19 female 1.5494 54.026 32 38 22.50483 (10,40]  
## 116 194 63 male 1.8542 79.450 34 39 23.10898 (40,70]  
## 117 231 58 female 1.6002 104.420 39 48 40.77887 (40,70]  
## 118 217 53 female 1.6002 71.732 33 40 28.01331 (40,70]  
## 119 174 50 male 1.7780 119.402 51 64 37.77010 (40,70]  
## 120 225 41 male 1.8034 70.824 31 40 21.77691 (40,70]  
## 121 268 48 male 1.7780 54.480 32 35 17.23350 (40,70]  
## 122 195 59 female 1.7018 78.088 38 43 26.96294 (40,70]  
## 123 179 34 male 1.8288 77.180 31 39 23.07663 (10,40]  
## 124 215 63 female 1.6002 71.732 34 42 28.01331 (40,70]  
## 125 185 23 male 1.9304 74.456 32 40 19.98044 (10,40]  
## 126 132 21 female 1.6510 76.726 39 43 28.14806 (10,40]  
## 127 175 23 female 1.6510 106.690 44 50 39.14079 (10,40]  
## 128 179 36 female 1.6002 56.750 33 36 22.16243 (10,40]  
## 129 228 71 female 1.6002 110.776 48 51 43.26106 (70,100]  
## 130 181 64 male 1.8034 102.150 44 47 31.40901 (40,70]  
## 131 160 43 female 1.6256 63.560 37 40 24.05229 (40,70]  
## 132 188 31 female 1.7018 103.058 47 53 35.58481 (10,40]  
## 133 168 44 female 1.6256 72.640 40 43 27.48834 (40,70]  
## 134 318 60 female 1.6510 75.818 38 44 27.81494 (40,70]  
## 135 192 43 female 1.6256 147.550 53 62 55.83568 (40,70]  
## 136 209 48 female 1.6002 54.934 32 38 21.45323 (40,70]  
## 137 129 56 male 1.8796 68.554 34 38 19.40448 (40,70]  
## 138 160 55 female 1.7018 101.242 43 48 34.95777 (40,70]  
## 139 160 49 male 1.8034 120.764 49 45 37.13243 (40,70]  
## 140 211 58 male 1.7018 80.358 38 43 27.74675 (40,70]  
## 141 262 33 female 1.6002 77.180 33 46 30.14090 (10,40]  
## 142 201 48 female 1.7272 66.284 32 41 22.21895 (40,70]  
## 143 263 66 female 1.6764 54.934 31 33 19.54726 (40,70]  
## 144 219 59 male 1.6764 77.180 37 40 27.46309 (40,70]  
## 145 191 45 female 1.7018 68.554 33 38 23.67095 (40,70]  
## 146 171 52 male 1.8034 72.186 33 39 22.19570 (40,70]  
## 147 219 76 male 1.6256 47.670 29 33 18.03922 (70,100]  
## 148 347 36 male 1.7780 125.758 51 49 39.78067 (10,40]  
## 149 269 41 female 1.5748 72.640 39 41 29.29038 (40,70]  
## 150 164 20 male 1.8288 65.830 29 36 19.68301 (10,40]  
## 151 181 50 male 1.8034 145.280 56 49 44.67059 (40,70]  
## 152 190 43 female 1.5748 74.002 40 45 29.83958 (40,70]  
## 153 255 82 male 1.6764 74.002 37 43 26.33226 (70,100]  
## 154 218 35 male 1.7526 76.726 39 41 24.97911 (10,40]  
## 155 223 47 female 1.6510 105.328 46 54 38.64112 (40,70]  
## 156 254 75 male 1.7272 95.340 44 45 31.95876 (70,100]  
## 157 236 62 male 1.9304 72.640 35 39 19.49311 (40,70]  
## 158 176 31 female 1.5748 65.830 36 42 26.54441 (10,40]  
## 159 158 50 male 1.7780 97.610 40 45 30.87669 (40,70]  
## 160 181 39 female 1.6764 115.770 46 54 41.19464 (10,40]  
## 161 151 33 male 1.7526 139.832 52 58 45.52406 (10,40]  
## 162 115 58 male 1.7526 NA 30 37 NA (40,70]  
## 163 271 81 female 1.6256 71.732 36 43 27.14473 (70,100]  
## 164 190 27 female 1.6510 95.340 39 47 34.97687 (10,40]  
## 165 118 47 female 1.6256 55.842 30 36 21.13166 (40,70]  
## 166 168 33 female 1.6764 53.572 29 35 19.06262 (10,40]  
## 167 254 67 male 1.7272 75.818 36 39 25.41482 (40,70]  
## 168 193 42 female 1.9050 84.444 37 46 23.26906 (40,70]  
## 169 187 21 female 1.6002 71.732 39 43 28.01331 (10,40]  
## 170 212 51 female 1.6510 65.830 38 42 24.15070 (40,70]  
## 171 170 27 female 1.6002 54.026 28 37 21.09863 (10,40]  
## 172 215 51 female 1.7018 128.028 52 59 44.20668 (40,70]  
## 173 199 71 male 1.7526 77.634 38 40 25.27472 (70,100]  
## 174 140 50 male 1.7526 78.088 37 41 25.42253 (40,70]  
## 175 216 54 female 1.6510 62.652 33 39 22.98480 (40,70]  
## 176 204 59 male 1.8542 84.898 38 37 24.69359 (40,70]  
## 177 193 59 female 1.6764 85.806 38 45 30.53250 (40,70]  
## 178 267 40 female 1.4986 92.616 40 47 41.23961 (10,40]  
## 179 201 58 male 1.6764 97.610 46 44 34.73274 (40,70]  
## 180 204 72 male 1.6510 75.818 45 46 27.81494 (70,100]  
## 181 246 66 female 1.6764 85.806 45 46 30.53250 (40,70]  
## 182 229 23 male 1.8288 81.720 34 41 24.43408 (10,40]  
## 183 172 42 female 1.6510 74.910 33 45 27.48183 (40,70]  
## 184 197 43 male 1.8034 81.266 37 44 24.98761 (40,70]  
## 185 205 75 male 1.7526 92.616 44 42 30.15230 (70,100]  
## 186 219 65 female 1.6002 105.782 40 53 41.31077 (40,70]  
## 187 174 34 male 1.8034 95.340 37 43 29.31508 (10,40]  
## 188 192 37 male 1.8034 88.530 36 43 27.22114 (10,40]  
## 189 206 61 female 1.6002 90.346 41 47 35.28259 (40,70]  
## 190 160 36 female 1.6256 83.990 39 45 31.78339 (10,40]  
## 191 216 45 female 1.7018 66.738 32 38 23.04391 (40,70]  
## 192 236 68 female 1.5494 54.026 29 37 22.50483 (40,70]  
## 193 205 57 male 1.6764 77.634 37 40 27.62464 (40,70]  
## 194 206 41 female 1.5748 83.536 39 44 33.68394 (40,70]  
## 195 143 68 male 1.7018 71.732 37 43 24.76828 (40,70]  
## 196 173 40 female NA 59.020 37 38 NA (10,40]  
## 197 235 79 female 1.6510 60.836 34 38 22.31858 (70,100]  
## 198 169 62 male 1.6764 113.954 50 47 40.54845 (40,70]  
## 199 283 63 female 1.5494 90.800 44 48 37.82324 (40,70]  
## 200 174 55 male 1.7780 63.560 32 33 20.10575 (40,70]  
## 201 271 55 female 1.6002 51.756 30 37 20.21213 (40,70]  
## 202 203 27 female 1.7018 94.886 34 43 32.76311 (10,40]  
## 203 188 66 male 1.7272 95.340 45 48 31.95876 (40,70]  
## 204 293 63 female 1.6256 81.266 47 45 30.75258 (40,70]  
## 205 215 78 male 1.6510 49.486 33 34 18.15466 (70,100]  
## 206 207 68 male 1.3970 59.020 29 33 30.24171 (40,70]  
## 207 179 31 male 1.6764 65.830 33 38 23.42440 (10,40]  
## 208 202 64 female 1.5748 75.818 44 47 30.57184 (40,70]  
## 209 211 40 female 1.7272 81.266 37 43 27.24104 (10,40]  
## 210 211 61 female 1.6002 65.376 40 42 25.53112 (40,70]  
## 211 151 28 male 1.7526 59.020 29 35 19.21470 (10,40]  
## 212 171 34 female 1.6002 74.456 34 43 29.07711 (10,40]  
## 213 342 63 female 1.6510 91.254 45 46 33.47787 (40,70]  
## 214 179 55 male 1.9050 84.444 38 38 23.26906 (40,70]  
## 215 155 26 male 1.8542 78.996 30 35 22.97693 (10,40]  
## 216 197 36 female 1.6256 61.744 32 37 23.36509 (10,40]  
## 217 200 40 female 1.5748 47.670 26 33 19.22181 (10,40]  
## 218 237 45 male 1.7526 59.020 33 35 19.21470 (40,70]  
## 219 198 68 female 1.6002 56.296 32 38 21.98513 (40,70]  
## 220 240 82 female 1.6002 77.180 41 46 30.14090 (70,100]  
## 221 192 60 female 1.5748 60.836 31 40 24.53069 (40,70]  
## 222 145 30 female 1.6510 74.910 33 42 27.48183 (10,40]  
## 223 269 41 male 1.7018 86.714 38 41 29.94141 (40,70]  
## 224 240 54 female 1.6510 79.450 37 43 29.14740 (40,70]  
## 225 205 72 female 1.5494 81.720 39 47 34.04092 (70,100]  
## 226 266 47 male 1.7272 64.468 35 39 21.61021 (40,70]  
## 227 188 50 female 1.5494 66.738 34 41 27.80008 (40,70]  
## 228 222 51 female 1.6764 49.940 28 37 17.77024 (40,70]  
## 229 142 45 male 1.7526 92.616 40 43 30.15230 (40,70]  
## 230 268 38 female 1.6002 82.174 38 46 32.09120 (10,40]  
## 231 174 20 male 1.7780 84.898 37 41 26.85554 (10,40]  
## 232 214 44 female NA 86.260 38 44 NA (40,70]  
## 233 194 63 male 1.7780 82.174 37 42 25.99387 (40,70]  
## 234 196 50 male 1.7018 63.560 35 37 21.94658 (40,70]  
## 235 207 44 female 1.7018 91.254 46 49 31.50902 (40,70]  
## 236 204 48 male 1.7272 88.984 38 42 29.82817 (40,70]  
## 237 189 41 female 1.6002 69.462 32 40 27.12681 (40,70]  
## 238 179 29 male 1.7272 77.180 38 39 25.87138 (10,40]  
## 239 159 76 male 1.6764 85.352 40 41 30.37095 (70,100]  
## 240 260 69 female 1.4986 81.266 45 48 36.18574 (40,70]  
## 241 228 26 male 1.8288 117.586 48 49 35.15792 (10,40]  
## 242 242 70 female 1.6764 90.800 41 47 32.30952 (40,70]  
## 243 227 25 male 1.8034 73.548 35 39 22.61449 (10,40]  
## 244 208 42 female 1.5748 64.014 33 40 25.81215 (40,70]  
## 245 208 56 male 1.7272 83.082 36 39 27.84977 (40,70]  
## 246 209 31 female 1.7018 72.640 30 44 25.08181 (10,40]  
## 247 163 31 female 1.6510 54.480 29 40 19.98679 (10,40]  
## 248 201 27 female 1.6510 65.830 32 35 24.15070 (10,40]  
## 249 237 73 female 1.6256 78.996 38 44 29.89357 (70,100]  
## 250 176 32 female 1.6002 114.408 45 58 44.67945 (10,40]  
## 251 146 19 female 1.5240 61.290 33 40 26.38880 (10,40]  
## 252 231 71 female 1.6002 70.370 33 41 27.48141 (70,100]  
## 253 241 27 female 1.6002 81.266 40 42 31.73660 (10,40]  
## 254 305 31 male 1.8034 95.794 40 45 29.45467 (10,40]  
## 255 149 20 female 1.5748 52.210 31 37 21.05246 (10,40]  
## 256 183 31 female 1.6764 86.260 41 47 30.69405 (10,40]  
## 257 235 62 female 1.6002 131.660 55 62 51.41683 (40,70]  
## 258 244 44 male 1.8034 76.272 36 39 23.45206 (40,70]  
## 259 199 36 female 1.6764 115.770 47 52 41.19464 (10,40]  
## 260 224 36 male 1.7526 93.070 37 41 30.30010 (10,40]  
## 261 173 47 male 1.8542 118.040 42 47 34.33334 (40,70]  
## 262 192 30 male 1.8288 113.500 43 51 33.93622 (10,40]  
## 263 157 63 male 1.7526 75.364 39 38 24.53569 (40,70]  
## 264 172 48 female 1.6002 77.180 35 42 30.14090 (40,70]  
## 265 170 65 male 1.7526 82.628 42 39 26.90058 (40,70]  
## 266 215 59 female 1.6002 79.904 34 44 31.20470 (40,70]  
## 267 214 37 female 1.6256 65.830 34 42 24.91130 (10,40]  
## 268 195 78 male 1.6764 78.088 40 40 27.78619 (70,100]  
## 269 230 23 male 1.8034 125.758 50 49 38.66798 (10,40]  
## 270 206 38 female 1.7526 75.818 36 47 24.68350 (10,40]  
## 271 147 38 male 1.7526 93.070 39 41 30.30010 (10,40]  
## 272 234 41 male 1.7018 83.082 38 40 28.68732 (40,70]  
## 273 135 29 female 1.6510 55.842 26 37 20.48646 (10,40]  
## 274 226 49 female 1.6002 58.112 31 36 22.69433 (40,70]  
## 275 179 23 female 1.6510 83.082 43 45 30.47985 (10,40]  
## 276 163 29 female 1.5748 44.946 30 36 18.12342 (10,40]  
## 277 191 40 male 1.8288 122.580 45 49 36.65111 (10,40]  
## 278 138 38 female 1.5240 62.652 31 39 26.97522 (10,40]  
## 279 184 40 female 1.6002 129.390 50 60 50.53034 (10,40]  
## 280 181 29 male 1.7272 81.720 38 42 27.39322 (10,40]  
## 281 224 78 female 1.6002 72.640 36 45 28.36791 (70,100]  
## 282 293 50 male 1.8034 77.180 34 39 23.73125 (40,70]  
## 283 147 23 female 1.5494 83.990 43 47 34.98650 (10,40]  
## 284 198 60 male 1.7780 74.002 36 40 23.40884 (40,70]  
## 285 152 40 female 1.3208 84.898 38 49 48.66574 (10,40]  
## 286 277 60 female 1.5494 58.112 33 39 24.20687 (40,70]  
## 287 219 40 female 1.5748 69.462 36 44 28.00893 (10,40]  
## 288 182 30 female 1.5748 56.750 31 39 22.88311 (10,40]  
## 289 135 21 male 1.7526 70.370 31 39 22.90983 (10,40]  
## 290 277 63 female 1.6256 101.242 45 54 38.31187 (40,70]  
## 291 212 63 male 1.7780 73.094 37 40 23.12162 (40,70]  
## 292 162 43 male 1.7018 98.064 41 44 33.86044 (40,70]  
## 293 207 46 female 1.6002 81.266 38 46 31.73660 (40,70]  
## 294 255 64 male 1.7272 103.058 44 47 34.54590 (40,70]  
## 295 404 56 male 1.7526 72.186 38 39 23.50106 (40,70]  
## 296 239 35 male 1.8796 77.180 32 38 21.84610 (10,40]  
## 297 220 59 female 1.6764 62.652 32 38 22.29357 (40,70]  
## 298 165 22 female 1.6002 51.756 28 35 20.21213 (10,40]  
## 299 243 43 female 1.6256 108.506 48 53 41.06070 (40,70]  
## 300 149 26 female 1.5748 78.996 38 46 31.85329 (10,40]  
## 301 178 41 female 1.6510 85.352 35 46 31.31263 (40,70]  
## 302 190 43 female 1.6510 89.892 40 49 32.97820 (40,70]  
## 303 226 20 female 1.6256 51.756 31 39 19.58544 (10,40]  
## 304 132 28 female 1.7272 102.150 41 52 34.24153 (10,40]  
## 305 160 30 female 1.6002 64.922 33 40 25.35382 (10,40]  
## 306 204 66 male 1.7018 66.284 36 48 22.88715 (40,70]  
## 307 164 20 female 1.7780 64.014 32 39 20.24937 (10,40]  
## 308 155 32 female 1.6510 68.554 33 40 25.15004 (10,40]  
## 309 251 38 female 1.6256 112.592 49 58 42.60692 (10,40]  
## 310 198 61 male 1.8796 69.008 33 38 19.53298 (40,70]  
## 311 179 26 female 1.5240 59.020 32 40 25.41144 (10,40]  
## 312 223 74 female 1.5748 74.910 41 46 30.20571 (70,100]  
## 313 207 72 male 1.7780 81.720 39 40 25.85026 (70,100]  
## 314 244 21 male 1.8034 74.002 34 39 22.75408 (10,40]  
## 315 245 36 male 1.6764 81.266 37 42 28.91702 (10,40]  
## 316 191 42 female 1.5494 70.824 36 42 29.50213 (40,70]  
## 317 221 66 female 1.6256 59.020 31 38 22.33427 (40,70]  
## 318 300 34 female NA 72.640 40 47 NA (10,40]  
## 319 173 43 female 1.7526 95.340 44 47 31.03913 (40,70]  
## 320 138 57 male 1.8542 74.456 31 37 21.65641 (40,70]  
## 321 203 45 male 1.6764 52.210 30 34 18.57798 (40,70]  
## 322 260 44 female 1.5748 72.186 36 43 29.10732 (40,70]  
## 323 166 27 male 1.8288 64.014 33 38 19.14003 (10,40]  
## 324 180 63 male 1.7526 76.726 35 39 24.97911 (40,70]  
## 325 159 65 male 1.7780 82.174 43 49 25.99387 (40,70]  
## 326 207 30 male 1.8288 81.720 35 41 24.43408 (10,40]  
## 327 298 28 male 1.6764 94.886 42 46 33.76345 (10,40]  
## 328 203 41 male 1.8034 95.340 37 42 29.31508 (40,70]  
## 329 191 31 female 1.5748 107.598 53 56 43.38638 (10,40]  
## 330 231 33 male 1.7526 74.002 35 38 24.09228 (10,40]  
## 331 184 66 male 1.8796 83.990 40 41 23.77370 (40,70]  
## 332 164 28 female 1.7018 81.720 39 43 28.21703 (10,40]  
## 333 134 25 female 1.6002 111.230 47 58 43.43836 (10,40]  
## 334 220 26 male 1.7780 68.100 33 39 21.54188 (10,40]  
## 335 180 40 female 1.6256 66.284 37 43 25.08311 (10,40]  
## 336 216 38 male 1.7272 65.830 34 37 22.06676 (10,40]  
## 337 158 30 female 1.5748 64.468 NA NA 25.99521 (10,40]  
## 338 261 52 female 1.6256 89.892 42 49 34.01682 (40,70]  
## 339 172 22 female 1.6256 67.192 35 38 25.42671 (10,40]  
## 340 249 51 female 1.6510 90.800 43 46 33.31131 (40,70]  
## 341 189 45 male 1.7526 86.260 39 44 28.08302 (40,70]  
## 342 225 53 female 1.6002 82.628 38 46 32.26849 (40,70]  
## 343 193 21 female 1.5494 99.880 40 52 41.60557 (10,40]  
## 344 219 53 female 1.6256 81.266 39 47 30.75258 (40,70]  
## 345 156 37 female 1.7018 96.248 48 51 33.23339 (10,40]  
## 346 224 34 female 1.5240 74.910 34 46 32.25298 (10,40]  
## 347 181 30 female 1.6764 116.678 47 55 41.51774 (10,40]  
## 348 306 74 male 1.7526 83.536 39 41 27.19619 (70,100]  
## 349 122 36 female 1.8034 83.082 41 45 25.54599 (10,40]  
## 350 219 45 male 1.7018 98.972 41 45 34.17396 (40,70]  
## 351 150 35 male 1.8542 81.266 32 37 23.63718 (10,40]  
## 352 185 50 female 1.6256 103.512 42 54 39.17088 (40,70]  
## 353 226 27 male 1.7526 131.206 48 51 42.71575 (10,40]  
## 354 206 52 male 1.7526 69.462 36 40 22.61422 (40,70]  
## 355 199 42 female 1.7018 106.690 47 52 36.83890 (40,70]  
## 356 239 39 male 1.5240 65.376 33 42 28.14806 (10,40]  
## 357 235 73 male 1.6510 83.082 43 46 30.47985 (70,100]  
## 358 184 28 male 1.7018 69.916 35 38 24.14124 (10,40]  
## 359 242 53 male 1.7526 98.064 43 45 31.92596 (40,70]  
## 360 307 49 male 1.7018 82.174 41 42 28.37379 (40,70]  
## 361 204 55 female 1.6764 91.708 43 47 32.63262 (40,70]  
## 362 212 37 female 1.6256 72.640 37 45 27.48834 (10,40]  
## 363 203 60 female 1.4986 55.842 36 41 24.86506 (40,70]  
## 364 219 56 female 1.6510 89.438 41 50 32.81164 (40,70]  
## 365 226 84 female 1.5240 87.168 41 48 37.53074 (70,100]  
## 366 217 20 female 1.7018 84.898 40 45 29.31436 (10,40]  
## 367 157 80 male 1.8034 96.248 47 48 29.59427 (70,100]  
## 368 235 60 male 1.7526 84.444 40 42 27.49180 (40,70]  
## 369 252 80 female 1.5748 73.548 44 41 29.65651 (70,100]  
## 370 204 29 female 1.6256 54.480 33 38 20.61625 (10,40]  
## 371 188 43 female 1.6764 69.008 37 41 24.55524 (40,70]  
## 372 194 63 female 1.4732 95.340 44 53 43.92904 (40,70]  
## 373 215 37 female 1.4986 67.192 32 42 29.91893 (10,40]  
## 374 179 20 female 1.4732 77.180 34 46 35.56161 (10,40]  
## 375 202 44 male 1.7272 71.278 33 37 23.89298 (40,70]  
## 376 194 54 male 1.7526 58.566 30 37 19.06689 (40,70]  
## 377 227 58 male 1.7780 95.794 38 43 30.30224 (40,70]  
## 378 337 35 male 1.8288 85.806 36 44 25.65578 (10,40]  
## 379 255 52 male 1.7780 54.480 30 33 17.23350 (40,70]  
## 380 162 60 female 1.6002 54.934 32 34 21.45323 (40,70]  
## 381 322 43 female 1.4224 54.480 32 41 26.92735 (40,70]  
## 382 289 59 male 1.7272 76.726 36 38 25.71919 (40,70]  
## 383 217 33 female 1.5748 84.444 42 46 34.05007 (10,40]  
## 384 209 37 male 1.7780 118.948 42 48 37.62648 (10,40]  
## 385 214 40 male 1.8288 100.788 40 44 30.13536 (10,40]  
## 386 302 38 female 1.7018 100.788 41 51 34.80101 (10,40]  
## 387 179 32 female 1.5748 81.266 37 47 32.76861 (10,40]  
## 388 279 60 female 1.7272 101.696 48 50 34.08934 (40,70]  
## 389 144 30 male 1.8288 74.910 31 38 22.39790 (10,40]  
## 390 270 42 male 1.6764 83.990 39 41 29.88631 (40,70]  
## 391 196 52 female 1.5748 66.738 34 42 26.91054 (40,70]  
## 392 221 59 female 1.5748 80.358 39 45 32.40248 (40,70]  
## 393 210 78 male 1.6764 65.830 38 39 23.42440 (70,100]  
## 394 192 51 male 1.6510 66.284 NA NA 24.31726 (40,70]  
## 395 169 25 female 1.5240 69.916 40 42 30.10278 (10,40]  
## 396 179 37 male 1.6764 61.744 33 39 21.97048 (10,40]  
## 397 216 54 female 1.6764 76.272 38 42 27.14000 (40,70]  
## 398 301 89 female 1.5494 52.210 31 41 21.74836 (70,100]  
## 399 296 53 male 1.7526 78.542 35 39 25.57033 (40,70]  
## 400 284 51 female 1.6002 69.916 32 43 27.30411 (40,70]  
## 401 194 29 female 1.7526 75.818 33 40 24.68350 (10,40]  
## 402 199 41 female 1.6002 89.438 41 48 34.92799 (40,70]  
## 403 159 68 female 1.6256 99.880 49 58 37.79646 (40,70]

* Usando dplyr calcula cuántas observaciones hay en cada nivel de ageGroup (indicación: usa group\_by). Ahora, usando aquellas observaciones que corresponden a mujeres, ¿cuál es la media del nivel de colesterol y de BMI en cada uno de esos grupos de edad?

#Frecuencia de cada grupo de edad  
  
(chlstrl %>%   
 count(ageGroup))

## ageGroup n  
## 1 (10,40] 160  
## 2 (40,70] 207  
## 3 (70,100] 36

#Cálculo de la media del colesterol y BMI por grupos de edad  
  
(chlstrl %>%   
 filter(gender=='female') %>%   
 group\_by(ageGroup) %>%   
 summarise(MedChol=mean(chol, na.rm = TRUE), MedBMI=mean(BMI, na.rm=TRUE)))

## # A tibble: 3 x 3  
## ageGroup MedChol MedBMI  
## <fct> <dbl> <dbl>  
## 1 (10,40] 189. 30.5  
## 2 (40,70] 221. 30.3  
## 3 (70,100] 230. 29.4

# Ejercicio 2: Funciones de R.

* Crea una función de R llamada cambiosSigno que dado un vector x de números enteros no nulos, como
* -12, -19, 9, -13, -14, -17, 8, -19, -14,
* calcule cuántos cambios de signo ha habido. Es decir, cuántas veces el signo de un elemento es distinto del signo del elemento previo. Por ejemplo, en el vector anterior hay 4 cambios de signo (en las posiciones 3, 4, 7 y 8).

cambiossigno=function(x=sample(c(-1,1), 9, replace = TRUE) \* sample(1:20, 9, replace = TRUE)){  
 sol=list()  
 a=length(x)  
 cs=0  
 for(y in 1:(a-1)){  
 if ((x[y]>0)==TRUE && (x[y+1]<0)==TRUE){  
 cs=cs+1  
   
 }else if ((x[y]<0)==TRUE && (x[y+1]>0)==TRUE){  
 cs=cs+1  
 }  
 }  
 sol$vector=x  
 sol$cambSigno=cs  
 returnValue(sol)  
}  
cambiossigno(x)

## $vector  
## [1] -12 -19 9 -13 -14 -17 8 -19 -14  
##   
## $cambSigno  
## [1] 4

cambiossigno()

## $vector  
## [1] 5 -1 14 -7 6 -6 -17 -16 6  
##   
## $cambSigno  
## [1] 6

* Modifica la función para que devuelva como resultado las posiciones donde hay cambios de signo. Llama cambiosSignoPos(x) a esa otra función. Por ejemplo, para el vector anterior el resultado de esta función sería [1] 3 4 7 8

cambiossignopos=function(x=sample(c(-1,1), 9, replace = TRUE) \* sample(1:20, 9, replace = TRUE)){  
 sol=list()  
 a=length(x)  
 pos=c()  
 for(y in 1:(a-1)){  
 if ((x[y]>0)==TRUE && (x[y+1]<0)==TRUE){  
 pos=append(pos,y+1)  
 }else if ((x[y]<0)==TRUE && (x[y+1]>0)==TRUE){  
 pos=append(pos,y+1)  
 }  
 }  
 sol$vector=x  
 sol$posiciones=pos  
 returnValue(sol)  
}  
cambiossignopos(x)

## $vector  
## [1] -12 -19 9 -13 -14 -17 8 -19 -14  
##   
## $posiciones  
## [1] 3 4 7 8

También se valorará que incluyas en el código como usar `sample` para generar vectores aleatorios de 20 enteros \*no nulos\* (el vector debe poder tomar valores positivos y negativos).

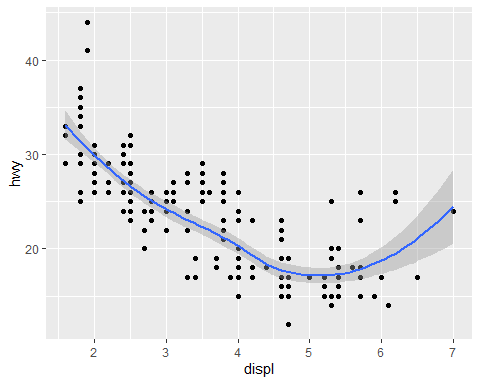
# Ejercicio 3. R4DS.

Es recomendable que esta semana del curso hagas al menos una lectura somera de los Capítulos 1 a 5 de [R for Data Science (R4DS), de H. Wickham](https://r4ds.had.co.nz/index.html), con énfasis especial en los Capítulos 3 y 5 (los capítulos 1, 2 y 4 son muy breves). Los siguientes apartados pretenden motivar esa lectura y por eso mismo pueden resultar un poco más laboriosos.

* Haz el [ejercicio 6 de la Sección 3.6.1 de R4DS](https://r4ds.had.co.nz/data-visualisation.html#exercises-3).

ggplot(data = mpg, mapping = aes(x = displ, y = hwy)) +   
 geom\_point() +   
 geom\_smooth()

## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'



g1=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy)) +   
 geom\_smooth(data = mpg, mapping = aes(x = displ, y = hwy), se=FALSE)

g2=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy)) +   
 geom\_smooth(data = mpg, mapping = aes(x = displ, y = hwy,group=drv), se=FALSE)

g3=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy, color=drv)) +   
 geom\_smooth(data = mpg, mapping = aes(x = displ, y = hwy, color=drv), se=FALSE)

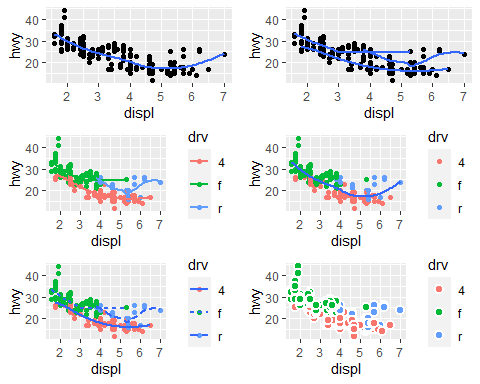
g4=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy, color=drv)) +   
 geom\_smooth(data = mpg, mapping = aes(x = displ, y = hwy), se=FALSE)

g5=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy, color=drv)) +   
 geom\_smooth(data = mpg, mapping = aes(x = displ, y = hwy, linetype=drv), se=FALSE)

g6=ggplot() +   
 geom\_point(data = mpg, mapping = aes(x = displ, y = hwy, fill=drv), shape = 21,color="white",size = 2.5, stroke = 1.5)

grid.arrange(g1,g2,g3,g4,g5,g6,nrow = 3)

## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'  
## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'  
## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'  
## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'  
## `geom\_smooth()` using method = 'loess' and formula 'y ~ x'



* Haz el [ejercicio 1 de la Sección 5.2.4 de R4DS](https://r4ds.had.co.nz/transform.html#exercises-8).

Find all flights that

Had an arrival delay of two or more hours

flights %>%   
 filter(arr\_delay>=120)

## # A tibble: 10,200 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 811 630 101 1047 830  
## 2 2013 1 1 848 1835 853 1001 1950  
## 3 2013 1 1 957 733 144 1056 853  
## 4 2013 1 1 1114 900 134 1447 1222  
## 5 2013 1 1 1505 1310 115 1638 1431  
## 6 2013 1 1 1525 1340 105 1831 1626  
## 7 2013 1 1 1549 1445 64 1912 1656  
## 8 2013 1 1 1558 1359 119 1718 1515  
## 9 2013 1 1 1732 1630 62 2028 1825  
## 10 2013 1 1 1803 1620 103 2008 1750  
## # ... with 10,190 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Flew to Houston (IAH or HOU) (2 opciones distintas)

flights %>%   
filter(dest=='IAH'| dest=='HOU')

## # A tibble: 9,313 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 517 515 2 830 819  
## 2 2013 1 1 533 529 4 850 830  
## 3 2013 1 1 623 627 -4 933 932  
## 4 2013 1 1 728 732 -4 1041 1038  
## 5 2013 1 1 739 739 0 1104 1038  
## 6 2013 1 1 908 908 0 1228 1219  
## 7 2013 1 1 1028 1026 2 1350 1339  
## 8 2013 1 1 1044 1045 -1 1352 1351  
## 9 2013 1 1 1114 900 134 1447 1222  
## 10 2013 1 1 1205 1200 5 1503 1505  
## # ... with 9,303 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

flights %>%   
filter(dest %in% c('IAH','HOU'))

## # A tibble: 9,313 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 517 515 2 830 819  
## 2 2013 1 1 533 529 4 850 830  
## 3 2013 1 1 623 627 -4 933 932  
## 4 2013 1 1 728 732 -4 1041 1038  
## 5 2013 1 1 739 739 0 1104 1038  
## 6 2013 1 1 908 908 0 1228 1219  
## 7 2013 1 1 1028 1026 2 1350 1339  
## 8 2013 1 1 1044 1045 -1 1352 1351  
## 9 2013 1 1 1114 900 134 1447 1222  
## 10 2013 1 1 1205 1200 5 1503 1505  
## # ... with 9,303 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Were operated by United, American, or Delta

flights %>%   
filter(carrier=='UA'| carrier=='AA' | carrier=='DL')

## # A tibble: 139,504 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 517 515 2 830 819  
## 2 2013 1 1 533 529 4 850 830  
## 3 2013 1 1 542 540 2 923 850  
## 4 2013 1 1 554 600 -6 812 837  
## 5 2013 1 1 554 558 -4 740 728  
## 6 2013 1 1 558 600 -2 753 745  
## 7 2013 1 1 558 600 -2 924 917  
## 8 2013 1 1 558 600 -2 923 937  
## 9 2013 1 1 559 600 -1 941 910  
## 10 2013 1 1 559 600 -1 854 902  
## # ... with 139,494 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

flights %>%   
filter(carrier %in% c('UA','AA','DL'))

## # A tibble: 139,504 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 517 515 2 830 819  
## 2 2013 1 1 533 529 4 850 830  
## 3 2013 1 1 542 540 2 923 850  
## 4 2013 1 1 554 600 -6 812 837  
## 5 2013 1 1 554 558 -4 740 728  
## 6 2013 1 1 558 600 -2 753 745  
## 7 2013 1 1 558 600 -2 924 917  
## 8 2013 1 1 558 600 -2 923 937  
## 9 2013 1 1 559 600 -1 941 910  
## 10 2013 1 1 559 600 -1 854 902  
## # ... with 139,494 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Departed in summer (July, August, and September) (2 opciones distintas)

flights %>%   
filter(month==7 | month==8 | month==9 )

## # A tibble: 86,326 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 7 1 1 2029 212 236 2359  
## 2 2013 7 1 2 2359 3 344 344  
## 3 2013 7 1 29 2245 104 151 1  
## 4 2013 7 1 43 2130 193 322 14  
## 5 2013 7 1 44 2150 174 300 100  
## 6 2013 7 1 46 2051 235 304 2358  
## 7 2013 7 1 48 2001 287 308 2305  
## 8 2013 7 1 58 2155 183 335 43  
## 9 2013 7 1 100 2146 194 327 30  
## 10 2013 7 1 100 2245 135 337 135  
## # ... with 86,316 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

flights %>%   
filter(month %in% c(7:9))

## # A tibble: 86,326 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 7 1 1 2029 212 236 2359  
## 2 2013 7 1 2 2359 3 344 344  
## 3 2013 7 1 29 2245 104 151 1  
## 4 2013 7 1 43 2130 193 322 14  
## 5 2013 7 1 44 2150 174 300 100  
## 6 2013 7 1 46 2051 235 304 2358  
## 7 2013 7 1 48 2001 287 308 2305  
## 8 2013 7 1 58 2155 183 335 43  
## 9 2013 7 1 100 2146 194 327 30  
## 10 2013 7 1 100 2245 135 337 135  
## # ... with 86,316 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Arrived more than two hours late, but didn’t leave late

flights %>%   
filter(arr\_delay >120, dep\_delay<=0)

## # A tibble: 29 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 27 1419 1420 -1 1754 1550  
## 2 2013 10 7 1350 1350 0 1736 1526  
## 3 2013 10 7 1357 1359 -2 1858 1654  
## 4 2013 10 16 657 700 -3 1258 1056  
## 5 2013 11 1 658 700 -2 1329 1015  
## 6 2013 3 18 1844 1847 -3 39 2219  
## 7 2013 4 17 1635 1640 -5 2049 1845  
## 8 2013 4 18 558 600 -2 1149 850  
## 9 2013 4 18 655 700 -5 1213 950  
## 10 2013 5 22 1827 1830 -3 2217 2010  
## # ... with 19 more rows, and 11 more variables: arr\_delay <dbl>, carrier <chr>,  
## # flight <int>, tailnum <chr>, origin <chr>, dest <chr>, air\_time <dbl>,  
## # distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Were delayed by at least an hour, but made up over 30 minutes in flight

flights %>%   
filter(dep\_delay >=60,arr\_delay<(dep\_delay-30))

## # A tibble: 1,844 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 2205 1720 285 46 2040  
## 2 2013 1 1 2326 2130 116 131 18  
## 3 2013 1 3 1503 1221 162 1803 1555  
## 4 2013 1 3 1839 1700 99 2056 1950  
## 5 2013 1 3 1850 1745 65 2148 2120  
## 6 2013 1 3 1941 1759 102 2246 2139  
## 7 2013 1 3 1950 1845 65 2228 2227  
## 8 2013 1 3 2015 1915 60 2135 2111  
## 9 2013 1 3 2257 2000 177 45 2224  
## 10 2013 1 4 1917 1700 137 2135 1950  
## # ... with 1,834 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>

Departed between midnight and 6am (inclusive)

flights %>%   
filter(dep\_time==2400 | dep\_time<=600)

## # A tibble: 9,373 x 19  
## year month day dep\_time sched\_dep\_time dep\_delay arr\_time sched\_arr\_time  
## <int> <int> <int> <int> <int> <dbl> <int> <int>  
## 1 2013 1 1 517 515 2 830 819  
## 2 2013 1 1 533 529 4 850 830  
## 3 2013 1 1 542 540 2 923 850  
## 4 2013 1 1 544 545 -1 1004 1022  
## 5 2013 1 1 554 600 -6 812 837  
## 6 2013 1 1 554 558 -4 740 728  
## 7 2013 1 1 555 600 -5 913 854  
## 8 2013 1 1 557 600 -3 709 723  
## 9 2013 1 1 557 600 -3 838 846  
## 10 2013 1 1 558 600 -2 753 745  
## # ... with 9,363 more rows, and 11 more variables: arr\_delay <dbl>,  
## # carrier <chr>, flight <int>, tailnum <chr>, origin <chr>, dest <chr>,  
## # air\_time <dbl>, distance <dbl>, hour <dbl>, minute <dbl>, time\_hour <dttm>