Activa tu directorio de trabajo

```
> getwd()

[1] "C:/Users/CECER01/Documents/PracticaRecodificacionVariables"

> setwd("C:/Users/CECER01/Documents/PracticaRecodificacionVariables")
```

Recupera desde el archivo la hoja de datos

```
> library(readxl)
> Densidad_Poblacional=read_excel("C:/Users/CECER01/Downloads/Densidad_Poblacional.xlsx",
+   sheet="Municipios",skip=8)
> Densidad_Poblacional

# A tibble: 277 x 6
   MUNICIPIO           AREA `POBLACION TOTA~ HOMBRES MUJERES `DENSIDAD POBLACIO~
   <chr>              <dbl>            <dbl>   <dbl>   <dbl>               <dbl>
 1 01-AHUACHAPÁN     1240.            319503  155159  164344                258.
 2 Ahuachapán         245.            110511   52808   57703                451.
 3 Apaneca             45.1             8383    4088    4295                186.
 4 Atiquizaya          66.6            33587   16238   17349                504.
 5 Concepción de At~   61.0            12786    6276    6510                210.
 6 El Refugio          11.0             8171    3896    4275                742.
 7 Guaymango           60.2            19037    9487    9550                316.
 8 Jujutla            264.             28599   13981   14618                108.
 9 San Francisco Me~  226.             42607   20769   21838                188.
10 San Lorenzo         48.3             9194    4657    4537                190.
# ... with 267 more rows
```

Cargar el paquete car(en el cual se encuentra la funcion para recodificar variables)

```
> library(carData)
> library(car)
```

Hacer la recodgicacion de la variable

```
> Densidad_Poblacional$MUNIC=recode(Densidad_Poblacional$MUNICIPIO,
+                                   "1:13='Ahuachapan';14:27='Santa Ana';
+                                   28:44='Sonsonate';45:78='Chalatenango';
+                                   79:101='La Libertad';102:121='San Sanvador';
+                                   122:138='Cuscatlan';139:161='La Paz';
+                                   162:171='Cabañas';172:185='San Vicente';
+                                   186:197='Usulutan';198:218='San Miguel';
+                                   219:245='Morazan';246:264='La Unión'")

> names(Densidad_Poblacional)
```

```
[1] "MUNICIPIO"            "AREA"                 "POBLACION TOTAL"
[4] "HOMBRES"              "MUJERES"              "DENSIDAD POBLACIONAL"
[7] "MUNIC"
```

```
> # Cambiar el nombre al tercera olumna
> names(Densidad_Poblacional)[3]<-'Pob_Total'
```

```
> print(head(Densidad_Poblacional))
```

```
# A tibble: 6 x 7
  MUNICIPIO        AREA Pob_Total HOMBRES MUJERES `DENSIDAD POBLACI~ MUNIC
  <chr>           <dbl>     <dbl>   <dbl>   <dbl>              <dbl> <chr>
1 01-AHUACHAPÁN  1240.     319503  155159  164344               258. 01-AHUACHA~
2 Ahuachapán      245.     110511   52808   57703               451. Ahuachapán
3 Apaneca          45.1      8383    4088    4295               186. Apaneca
4 Atiquizaya       66.6     33587   16238   17349               504. Atiquizaya
5 Concepción de~   61.0     12786    6276    6510               210. Concepción~
6 El Refugio       11.0      8171    3896    4275               742. El Refugio
```

```
> # Pasamos a factor la variable MUNIC
> Densidad_Poblacional$MUNIC=as.factor(Densidad_Poblacional$MUNIC)
> levels(Densidad_Poblacional$MUNIC)
```

```
 [1] "01-AHUACHAPÁN"
 [2] "02-SANTA ANA"
 [3] "03-SONSONATE"
 [4] "04-CHALATENANGO"
 [5] "05-LA LIBERTAD"
 [6] "06-SAN SALVADOR"
 [7] "07-CUSCATLÁN"
 [8] "08-LA PAZ"
 [9] "09-CABAÑAS"
[10] "Acajutla"
[11] "Agua Caliente"
[12] "Aguilares"
[13] "Ahuachapan"
[14] "Ahuachapán"
[15] "Alegría"
[16] "Anamoros"
[17] "Antiguo Cuscatlán"
[18] "Apaneca"
[19] "Apastepeque"
[20] "Apopa"
[21] "Arambala"
[22] "Arcatao"
[23] "Armenia"
[24] "Atiquizaya"
```

```
[25] "Ayutuxtepeque"
[26] "Azacualpa"
[27] "Berlín"
[28] "Bolívar"
[29] "Cacaopera"
[30] "California"
[31] "Caluco"
[32] "Cancasque"
[33] "Candelaria"
[34] "Candelaria de la Frontera"
[35] "Carolina"
[36] "Chalatenango"
[37] "Chalchuapa"
[38] "Chapeltique"
[39] "Chilanga"
[40] "Chiltiupán"
[41] "Chinameca"
[42] "Chirilagua"
[43] "Cinquera"
[44] "Citalá"
[45] "Ciudad Arce"
[46] "Ciudad Barrios"
[47] "Coatepeque"
[48] "Cojutepeque"
[49] "Colón"
[50] "Comacarán"
[51] "Comalapa"
[52] "Comasagua"
[53] "Concepción Batres"
[54] "Concepción de Ataco"
[55] "Concepción de Oriente"
[56] "Concepción Quezaltepeque"
[57] "Conchagua"
[58] "Corinto"
[59] "Cuisnahuat"
[60] "Cuscatancingo"
[61] "Cuscatlan"
[62] "Cuyultitán"
[63] "Delgado"
[64] "Delicias de Concepción"
[65] "Dolores"
[66] "Dulce Nombre de Maria"
[67] "El Carmen"
[68] "El Carrizal"
[69] "El Congo"
[70] "El Divisadero"
```

```
 [71] "El Paisnal"
 [72] "El Paraíso"
 [73] "El Porvenir"
 [74] "El Refugio"
 [75] "El Rosario"
 [76] "El Sauce"
 [77] "El Transito"
 [78] "El Triunfo"
 [79] "Ereguayquin"
 [80] "Estanzuelas"
 [81] "FUENTE: DIGESTYC - VI CENSO DE POBLACIÓN Y V DE VIVIENDA"
 [82] "Guacotecti"
 [83] "Guadalupe"
 [84] "Gualococti"
 [85] "Guatajiagua"
 [86] "Guaymango"
 [87] "Guazapa"
 [88] "Huizucar"
 [89] "Ilobasco"
 [90] "Ilopango"
 [91] "Intipucá"
 [92] "Izalco"
 [93] "Jayaque"
 [94] "Jerusalen"
 [95] "Jicalápa"
 [96] "Jiquilisco"
 [97] "Joateca"
 [98] "Jocoaitique"
 [99] "Jocoro"
[100] "Juayúa"
[101] "Jucuapa"
[102] "Jucuarán"
[103] "Jujutla"
[104] "Jutiapa"
[105] "La Laguna"
[106] "La Libertad"
[107] "La Palma"
[108] "La Reina"
[109] "La Unión"
[110] "Las Flores"
[111] "Las Vueltas"
[112] "Lislique"
[113] "Lolotique"
[114] "Lolotiquillo"
[115] "Masahuat"
[116] "Meanguera"
```

```
[117] "Meanguera del Golfo"
[118] "Mejicanos"
[119] "Mercedes la Ceiba"
[120] "Mercedes Umaña"
[121] "Metapán"
[122] "Moncagua"
[123] "Monte San Juán"
[124] "Nahuizalco"
[125] "Nahulingo"
[126] "Nejapa"
[127] "Nombre de Jesús"
[128] "Nueva Concepción"
[129] "Nueva Esparta"
[130] "Nueva Granada"
[131] "Nueva Guadalupe"
[132] "Nueva Trinidad"
[133] "Nuevo Cuscatlán"
[134] "Nuevo Edén de San Juan"
[135] "Ojos de Agua"
[136] "Olocuilta"
[137] "Oratorio de Concepción"
[138] "Osicala"
[139] "Ozatlán"
[140] "Panchimalco"
[141] "Paraíso de Osorio"
[142] "Pasaquina"
[143] "Perquín"
[144] "Polorós"
[145] "Potonico"
[146] "Puerto El Triunfo"
[147] "Quelepa"
[148] "Quezaltepeque"
[149] "Rosario de Mora"
[150] "Sacacoyo"
[151] "Salcoatitán"
[152] "San Agustín"
[153] "San Alejo"
[154] "San Antonio"
[155] "San Antonio de la Cruz"
[156] "San Antonio del Monte"
[157] "San Antonio los Ranchos"
[158] "San Antonio Masahuat"
[159] "San Antonio Pajonal"
[160] "San Bartolomé Perulapía"
[161] "San Buena Ventura"
[162] "San Carlos"
```

```
[163] "San Cayetano Istepeque"
[164] "San Cristóbal"
[165] "San Dionisio"
[166] "San Emigdio"
[167] "San Esteban Catarina"
[168] "San Fernando"
[169] "San Francisco Chinameca"
[170] "San Francisco Gotera"
[171] "San Francisco Javier"
[172] "San Francisco Lempa"
[173] "San Francisco Menéndez"
[174] "San Francisco Morazán"
[175] "San Gerardo"
[176] "San Ignacio"
[177] "San Ildefonso"
[178] "San Isidro"
[179] "San Isidro Labrador"
[180] "San Jorge"
[181] "San José"
[182] "San José Guayabal"
[183] "San José Villanueva"
[184] "San Juan Nonualco"
[185] "San Juán Opico"
[186] "San Juan Talpa"
[187] "San Juan Tepezontes"
[188] "San Julián"
[189] "San Lorenzo"
[190] "San Luís de La Reina"
[191] "San Luís del Carmen"
[192] "San Luís La Herradura"
[193] "San Luís Talpa"
[194] "San Marcos"
[195] "San Martín"
[196] "San Matías"
[197] "San Miguel"
[198] "San Miguel de Mercedes"
[199] "San Miguel Tepezontes"
[200] "San Pablo Tacachico"
[201] "San Pedro Masahuat"
[202] "San Pedro Nonualco"
[203] "San Pedro Perulapán"
[204] "San Pedro Puxtla"
[205] "San Rafael"
[206] "San Rafael Cedros"
[207] "San Rafael Obrajuelo"
[208] "San Rafael Oriente"
```

```
[209] "San Ramón"
[210] "San Salvador"
[211] "San Sebastián"
[212] "San Sebastián Salitrillo"
[213] "San Simón"
[214] "San Vicente"
[215] "Santa Ana"
[216] "Santa Catarina Masahuat"
[217] "Santa Clara"
[218] "Santa Cruz Analquito"
[219] "Santa Cruz Michapa"
[220] "Santa Elena"
[221] "Santa Isabel Ishuatán"
[222] "Santa Maria"
[223] "Santa Maria Ostuma"
[224] "Santa Rita"
[225] "Santa Rosa de Lima"
[226] "Santa Rosa Guachipilín"
[227] "Santa Tecla"
[228] "Santiago de la Frontera"
[229] "Santiago de Maria"
[230] "Santiago Nonualco"
[231] "Santiago Texacuangos"
[232] "Santo Domingo"
[233] "Santo Domingo de Guzmán"
[234] "Santo Tomas"
[235] "Sensembra"
[236] "Sensuntepeque"
[237] "Sesori"
[238] "Sociedad"
[239] "Sonsonate"
[240] "Sonzacate"
[241] "Soyapango"
[242] "Suchitoto"
[243] "Tacuba"
[244] "Talnique"
[245] "Tamanique"
[246] "Tapalhuaca"
[247] "Tecapán"
[248] "Tecoluca"
[249] "Tejutepeque"
[250] "Tejutla"
[251] "Tenancingo"
[252] "Teotepeque"
[253] "Tepecoyo"
[254] "Tepetitán"
```

```
[255] "Texistepeque"
[256] "Tonacatepeque"
[257] "Torola"
[258] "Turín"
[259] "Uluazapa"
[260] "Usulután"
[261] "Verapaz"
[262] "Victoria"
[263] "Yamabal"
[264] "Yayantique"
[265] "Yoloaiquín"
[266] "Yucuaiquín"
[267] "Zacatecoluca"
[268] "Zaragoza"
```

CALCULO DE NUEVAS VARIABLES

```
> # Para ilustrar esto calcularemos la densidad poblacional de cada uno de los municipios
>
> # Creamos la nueva variable llamada Densidad
>
> Densidad_Poblacional$Densidad=Densidad_Poblacional$Pob_Total/
+   Densidad_Poblacional$AREA
> Densidad_Poblacional$Densidad

  [1]   257.74685   451.36007   185.75227   504.00660   209.50352   742.14351
  [7]   316.07173   108.35007   188.41817   190.23381   189.03210   199.07988
 [13]   430.27260   258.82897   248.94107   446.65782   289.85416   264.89117
 [19]   156.74029    47.63442    88.28176    63.15485   438.70510   613.47582
 [25]   128.35199   117.50339   100.14528   358.10960   314.29858   531.87081
 [31]   177.69784   173.57250   403.40534   237.38599  1430.09907   294.09938
 [37]   294.68028  1071.36599   228.41744   325.87322   107.51706   252.68625
 [43]   307.66353  2976.78571    95.60146    42.20394    44.06881   113.48651
 [49]    49.43535   222.08649    52.46976   106.16584   122.89684    93.46780
 [55]    97.31438   201.05485   151.93648    90.22861    71.34831    60.37376
 [61]    25.52267   110.90774   111.16937    36.11051   107.47362    42.03552
 [67]    74.01198   144.42462    58.89166    78.29246    40.33138   124.52639
 [73]    91.84975    55.04458   126.82305   179.76391   112.62702   126.60960
 [79]   399.69750  1736.11540   112.73536   695.18211  1153.94408   158.16123
 [85]   326.30273   232.65306   119.17074   222.20370   133.63689   419.86760
 [91]   487.66852   417.46617   339.27103   139.23472   157.29070  1086.52406
 [97]   139.80352   455.72005   112.33701   234.24926   991.85381  1768.49969
[103]   630.69395  2532.52315  4127.22949 12296.29630  3596.64871   115.95346
[109]   359.87431  2999.19145  6363.06510   353.38292   458.59731   290.00765
[115]  4297.00884  1302.97278  4374.94810   636.56619  1042.10526  8122.57739
[121]  1345.61066   306.11354   274.70732  1600.85905  2187.70492   296.97396
[127]   384.07213   147.12171   654.58976   456.42151   217.59476   494.36340
```

```
[133]   583.95484   400.50923   218.88230   411.80580    75.26418   176.93712
[139]   251.78529   649.24506  1581.90386    56.31025    98.00000   329.27074
[145]   378.22469   147.69337   284.35923   182.21510   289.28751   189.17526
[151]   202.56696   195.46891   328.60825   109.94810   209.62188   335.94771
[157]   891.91644   248.34163   328.26105   266.17750   204.87395   135.31912
[163]    42.50942    42.58303   264.15992   246.34547    98.09297    99.52764
[169]   131.66193   140.81552    85.92038   136.52219   152.14001   255.04417
[175]   300.00000   302.56547   126.13618    48.65017   878.18403   199.11319
[181]    68.45406    47.26113    83.93817   283.45043   257.38379   161.57930
[187]   289.82925   121.03293   107.66079   102.45275   174.36414   218.45769
[193]   125.67963   111.12817   510.71725    56.00567   213.15532    83.03800
[199]   247.76981    98.31634    63.01237   169.32999    43.01870   119.35128
[205]   315.76839   901.76471   482.65712   158.96324   522.81932   208.94661
[211]   155.70673   103.60212   288.47944    96.58772   364.25950    92.40324
[217]   420.01372   157.92483   220.09713   390.39895    63.89989   182.30527
[223]   313.66056    72.25978   241.64899    33.51766   367.70598   295.20213
[229]    52.65617    92.00988   120.49356    15.94431    80.62330   282.55170
[235]   162.22760   251.03858   124.13625    70.03138   196.02578   165.62103
[241]    63.52799    55.48698   158.27565   217.28559   165.46032   189.35175
[247]    28.96982   112.93990    63.42369   352.22557   243.61425   258.09913
[253]   133.51499    96.39959    52.21421    51.68887   267.43153   114.83990
[259]   134.73148    81.70188   118.93267   186.21411   116.94819    44.61864
[265]    80.08255   235.71973   135.44829    95.42380   111.85005    55.46523
[271]    76.62717    69.93324    65.78831   215.40915   164.14238   123.21493
[277]          NA
```

Ilustraremos tambien el calculo del indice de masculinidad en cada uno de los municipios, el cual se define como el numero de hombres entre el numero de mujeres (multilicada por 100 para mejores interpretaciones).

```
> # Cramos la nueva variable llamada IND.MASCULINIDAD
> Densidad_Poblacional$IND.MASCULINIDAD=Densidad_Poblacional$HOMBRES/
+   Densidad_Poblacional$MUJERES*100
> Densidad_Poblacional$IND.MASCULINIDAD
```

```
  [1]  94.41111  91.51691  95.18044  93.59617  96.40553  91.13450  99.34031
  [8]  95.64236  95.10486 102.64492  99.66607  98.49754  90.05070  92.03589
 [15]  94.56261  92.29151  95.25251  90.23643  98.45709  95.56196  89.27918
 [22]  96.11244  88.77478  91.95110  89.17882  93.73602  93.67841  93.62352
 [29]  95.38398  92.73490 105.83333 101.84713  94.20072  93.73614  93.34646
 [36]  96.36192  95.64752  87.65346  98.74241  96.41326  99.94143  92.91769
 [43]  91.16342  87.10715  91.61341  86.01666 101.64271  93.85666 102.42775
 [50]  93.70657  89.27273  86.55044  89.46596  88.89304  87.80488  93.73498
 [57]  95.66085  89.57236  89.66547 104.52196  93.01848  89.51817  89.14365
 [64] 105.27607  81.17589  91.54589  97.23404  95.76784  96.29069  97.70642
 [71] 102.84679  89.00351  92.14233  94.85050  98.80096  88.00705  92.81572
 [78]  93.21312  90.61705  82.92259 101.31166  93.06040  89.40205 101.05014
```

```
 [85]  94.50047  95.75146  98.83405  93.55307  90.68289  89.85502  94.45059
 [92]  94.13699  91.78931  95.30040  95.11401  84.35156  97.18108  98.62150
 [99]  96.99392  95.20240  90.22887  86.93137  86.17701  87.24648  96.83566
[106]  86.42260  88.09759  94.87076  94.28329  85.01853  84.61084  94.21150
[113]  93.68164  95.11233  88.16683  87.96631  83.90905  92.79547  92.10187
[120]  85.45353  88.90228  92.28469  93.18399  88.13566  92.54076  90.26150
[127]  91.49653  96.80968  93.79509  94.75410  99.05822  93.04303  88.35798
[134]  90.95599  98.54071  89.97744  97.19946  99.11920  92.44492  93.49256
[141]  91.59817  93.66993 104.16667  91.47322  98.32727  96.04052  94.47895
[148]  96.67199  90.02313  89.50086  98.14410  95.95698  91.78022  93.97177
[155]  93.35866  95.27227  85.91443 100.06680  92.59778  95.73484  90.89406
[162]  88.72880 104.31755  93.32927  87.62677  89.06375  90.45415  93.59325
[169]  86.41154  88.40042  87.52413  92.53079  94.17743  90.15598  89.77315
[176]  93.07640  91.38650  90.10989  92.71196  92.27823  98.33148  86.64929
[183]  93.70085  86.01434  98.25729  90.52192  93.65079  96.80239  89.06475
[190]  88.77883  90.01098  87.46936  89.66968  92.32070  93.73884  97.26672
[197]  93.66864  90.75781  89.47769  93.30924  94.27720  93.60918  91.36997
[204]  94.35861  88.31578  84.15995  87.83282  90.47266  86.53051  86.80615
[211]  89.94929  86.37943  89.50990  90.88738  98.55188  92.94331  87.77994
[218]  91.74701  88.90371  87.78996  90.28302  90.18318  93.93053  78.42027
[225]  88.79453  85.79433  83.94280  85.45911  90.14210  85.65097  89.66864
[232]  90.08351  91.91512  83.50359  89.03337  90.54054  88.30655  96.04685
[239]  98.15418  88.28916  93.29660  95.18318  86.50352  85.12241  91.42997
[246]  90.60762  84.67836  90.15497  89.77778  89.03458  90.87815  93.82195
[253]  84.09518  91.15133 102.39521  90.36356  83.68073  87.67588  86.55128
[260]  85.03073  79.28540  93.17512  91.24767  83.51556  92.59354  89.64461
[267]  89.45506  88.22606  85.86307  85.78398  80.55090  85.67208  89.11521
[274]  86.50997  85.25209  81.79144        NA
```

```
> print(head(Densidad_Poblacional))
```

```
# A tibble: 6 x 9
  MUNICIPIO   AREA Pob_Total HOMBRES MUJERES `DENSIDAD POBLA~ MUNIC Densidad
  <chr>      <dbl>     <dbl>   <dbl>   <dbl>            <dbl> <fct>    <dbl>
1 01-AHUAC~ 1240.     319503  155159  164344             258. 01-A~     258.
2 Ahuachap~  245.     110511   52808   57703             451. Ahua~     451.
3 Apaneca     45.1      8383    4088    4295             186. Apan~     186.
4 Atiquiza~   66.6     33587   16238   17349             504. Atiq~     504.
5 Concepci~   61.0     12786    6276    6510             210. Conc~     210.
6 El Refug~   11.0      8171    3896    4275             742. El R~     742.
# ... with 1 more variable: IND.MASCULINIDAD <dbl>
```

```
> names(Densidad_Poblacional)
```

```
[1] "MUNICIPIO"            "AREA"                 "Pob_Total"
[4] "HOMBRES"              "MUJERES"              "DENSIDAD POBLACIONAL"
[7] "MUNIC"                "Densidad"             "IND.MASCULINIDAD"
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