# Lab7

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Part 1

```
mysd1 <- function (x, na.rm=F) {
  if (is.vector(x)==TRUE)
    sqrt(var(x))
  else
    sqrt(var(as.double(x)))
}
mysd1(rivers)
```

```
## [1] 493.8708
```

```
sd(rivers)
```

```
## [1] 493.8708
```

Part 2

```
mysd2 <- function (x, na.rm=F) {
  if (is.vector(x)==TRUE)
    sqrt(var(x))
  else if (is.data.frame(x)==TRUE)
    sapply(x,sd)
  else
    sqrt(var(as.double(x)))
}
mysd2(rivers)
```

```
## [1] 493.8708
```

```
mysd2(USArrests)
```

```
##    Murder   Assault  UrbanPop      Rape
##  4.355510 83.337661 14.474763  9.366385
```

Part 3

```
mysd3 <- function (x, na.rm=F) {
  if (is.vector(x)==TRUE)
    sqrt(var(x)*((length(x)-1))/length(x))
  else if (is.data.frame(x)==TRUE)
    sapply(x,function(x) sqrt(var(x)*((length(x)-1))/length(x)))
  else
    sqrt(var(as.double(x))*((length(x)-1))/length(x))
}
mysd3(rivers)
```

```
## [1] 492.1164
```

```
mysd3(USArrests)
```

```
##    Murder   Assault  UrbanPop      Rape
##  4.311735 82.500075 14.329285  9.272248
```

Part 4

```
set.seed(1)
a <- data.frame(matrix(sample(1:1000,1000000,replace = T),nrow = 100000,ncol = 10))
names(a) <-
c("alpha","bravo","charlie","delta","echo","foxtrot","golf","hotel","india","juliet")

system.time({out <- data.frame(matrix(NA,nrow(a),ncol(a)))
names(out) <- names(a)
for (i in seq_along(a)) {
  out[[i]] <- sqrt(a[,i])
}
})
```

```
##    user  system elapsed
##   0.085   0.004   0.090
```

```
system.time({out2 <- data.frame(matrix(NA,nrow(a),ncol(a)))
names(out2) <- names(a)
nm <- names(a)
for (nm in names(a)) {
  out2[[nm]] <- sqrt(a[[nm]])
}
})
```

```
##    user  system elapsed
##   0.057   0.005   0.062
```

```
xs <- as.vector(unlist(a[1:1000,]))
system.time({
  res <- c()
  for (x in xs) {
    res <- c(res,sqrt(x))
  }
  res <- data.frame(matrix(res,nrow = 1000,ncol = 10))
})
```

```
##    user  system elapsed
##   0.205   0.043   0.249
```

```
system.time({a2 <- lapply(a,function(x) sqrt(x))
names(a2) <- names(a)
})
```

```
##    user  system elapsed
##   0.007   0.002   0.010
```

```
system.time({a2 <- lapply(seq_along(a),function(i) sqrt(a[[i]]))
names(a2) <- names(a)
})
```

```
##    user  system elapsed
##   0.008   0.002   0.009
```

```
system.time({nm <- names(a)
a2 <- lapply(names(a),function(nm) sqrt(a[[nm]]))
names(a2) <- names(a)
})
```

```
##    user  system elapsed
##   0.009   0.000   0.009
```

1.2.

```
lapply(swiss,function(x) class(x))
```

```
## $Fertility
## [1] "numeric"
##
## $Agriculture
## [1] "numeric"
##
## $Examination
## [1] "integer"
##
## $Education
## [1] "integer"
##
## $Catholic
## [1] "numeric"
##
## $Infant.Mortality
## [1] "numeric"
```

3.

```
as.data.frame(lapply(swiss,function(x) x/max(x)),row.names = row.names(swiss))
```

```
##              Fertility Agriculture Examination  Education Catholic
## Courtelary   0.8670270  0.18952062  0.40540541 0.22641509   0.0996
## Delemont     0.8983784  0.50278707  0.16216216 0.16981132   0.8484
## Franches-Mnt 1.0000000  0.44258640  0.13513514 0.09433962   0.9340
## Moutier      0.9275676  0.40691193  0.32432432 0.13207547   0.3377
## Neuveville   0.8313514  0.48494983  0.45945946 0.28301887   0.0516
## Porrentruy   0.8227027  0.39353400  0.24324324 0.13207547   0.9057
## Broye        0.9059459  0.78260870  0.43243243 0.13207547   0.9285
## Glane        0.9989189  0.75585284  0.37837838 0.15094340   0.9716
## Gruyere      0.8908108  0.59420290  0.32432432 0.13207547   0.9767
## Sarine       0.8962162  0.50390190  0.43243243 0.24528302   0.9138
## Veveyse      0.9416216  0.71906355  0.37837838 0.11320755   0.9861
## Aigle        0.6929730  0.69119287  0.56756757 0.22641509   0.0852
## Aubonne      0.7232432  0.75250836  0.37837838 0.13207547   0.0227
## Avenches     0.7448649  0.67670011  0.51351351 0.22641509   0.0443
## Cossonay     0.6670270  0.77257525  0.59459459 0.09433962   0.0282
## Echallens    0.7383784  0.80936455  0.48648649 0.03773585   0.2420
## Grandson     0.7751351  0.37904125  0.45945946 0.15094340   0.0330
## Lausanne     0.6021622  0.21627648  0.70270270 0.52830189   0.1211
## La Vallee    0.5870270  0.16945373  0.83783784 0.37735849   0.0215
## Lavaux       0.7037838  0.81382386  0.51351351 0.16981132   0.0284
## Morges       0.7081081  0.66666667  0.59459459 0.18867925   0.0523
## Moudon       0.7027027  0.61426979  0.37837838 0.05660377   0.0452
## Nyone        0.6118919  0.56744705  0.59459459 0.22641509   0.1514
## Orbe         0.6205405  0.60312152  0.54054054 0.11320755   0.0420
## Oron         0.7837838  0.79375697  0.32432432 0.01886792   0.0240
## Payerne      0.8021622  0.64771460  0.37837838 0.15094340   0.0523
## Paysd'enhaut 0.7783784  0.70791527  0.16216216 0.05660377   0.0256
## Rolle        0.6540541  0.67781494  0.43243243 0.18867925   0.0772
## Vevey        0.6302703  0.29877369  0.67567568 0.35849057   0.1846
## Yverdon      0.7070270  0.55183946  0.40540541 0.15094340   0.0610
## Conthey      0.8162162  0.95763657  0.08108108 0.03773585   0.9971
## Entremont    0.7491892  0.94648829  0.18918919 0.11320755   0.9968
## Herens       0.8356757  1.00000000  0.13513514 0.03773585   1.0000
## Martigwy     0.7621622  0.87179487  0.32432432 0.11320755   0.9896
## Monthey      0.8583784  0.72352285  0.18918919 0.05660377   0.9822
## St Maurice   0.7027027  0.84615385  0.24324324 0.16981132   0.9906
## Sierre       0.9967568  0.94314381  0.08108108 0.05660377   0.9946
## Sion         0.8572973  0.70345596  0.35135135 0.24528302   0.9683
## Boudry       0.7610811  0.42809365  0.70270270 0.22641509   0.0562
## La Chauxdfnd 0.7102703  0.08584169  0.78378378 0.20754717   0.1379
## Le Locle     0.7859459  0.18617614  0.59459459 0.24528302   0.1122
## Neuchatel    0.6962162  0.19620959  0.94594595 0.60377358   0.1692
## Val de Ruz   0.8389189  0.41917503  0.40540541 0.13207547   0.0497
## ValdeTravers 0.7308108  0.20847269  0.67567568 0.13207547   0.0865
## V. De Geneve 0.3783784  0.01337793  1.00000000 1.00000000   0.4234
## Rive Droite  0.4832432  0.51950948  0.43243243 0.54716981   0.5043
## Rive Gauche  0.4627027  0.30880713  0.59459459 0.54716981   0.5833
##              Infant.Mortality
## Courtelary          0.8345865
## Delemont            0.8345865
## Franches-Mnt        0.7593985
## Moutier             0.7631579
```

```
## Neuveville          0.7744361
## Porrentruy          1.0000000
## Broye               0.8872180
## Glane               0.9360902
## Gruyere             0.7894737
## Sarine              0.9172932
## Veveyse             0.9210526
## Aigle               0.6203008
## Aubonne             0.7180451
## Avenches            0.8533835
## Cossonay            0.7030075
## Echallens           0.7969925
## Grandson            0.7518797
## Lausanne            0.7593985
## La Vallee           0.4060150
## Lavaux              0.7518797
## Morges              0.6766917
## Moudon              0.8421053
## Nyone               0.6278195
## Orbe                0.5751880
## Oron                0.7894737
## Payerne             0.8947368
## Paysd'enhaut        0.6766917
## Rolle               0.6127820
## Vevey               0.7857143
## Yverdon             0.8458647
## Conthey             0.5676692
## Entremont           0.7443609
## Herens              0.6879699
## Martigwy            0.7293233
## Monthey             0.7593985
## St Maurice          0.6691729
## Sierre              0.6127820
## Sion                0.6804511
## Boudry              0.7631579
## La Chauxdfnd        0.7706767
## Le Locle            0.7105263
## Neuchatel           0.8646617
## Val de Ruz          0.7518797
## ValdeTravers        0.7330827
## V. De Geneve        0.6766917
## Rive Droite         0.6842105
## Rive Gauche         0.7255639
```

Part 5

```
someURL <- "http://www.stat.ucla.edu/~vlew/datasets/ucpay.zip"
download.file(someURL,"ucpay.zip")
unzip("ucpay.zip",exdir = "ucpaydata")
list.files("ucpaydata")
```

```
## [1] "__MACOSX"      "ucpay2009.csv" "ucpay2010.csv" "ucpay2011.csv"
```

```
uc09 <- read.csv("ucpaydata/ucpay2009.csv",header = F)
tail(uc09[order(uc09$V7),])
```

```
##             V1   V2            V3                       V4
## 138464 1385122 2009   LOS ANGELES         RUBIN , AMIR DAN
## 249973 1496631 2009          UCOP STOBO , JOHN DAVID , DR.
## 63499  1310157 2009         DAVIS        RICE , ANN MADDEN
## 250230 1496888 2009          UCOP      YUDOF , MARK GEORGE
## 119493 1366151 2009   LOS ANGELES       FEINBERG , DAVID T
## 209601 1456259 2009 SAN FRANCISCO           LARET , MARK R
##                                    V5       V6       V7 V8        V9 V10
## 138464     (FUNCTL AREA) OFFICER-EXEC 530615.9 547598.9  0 -16982.98   0
## 249973       SR. VICE PRES--DESIGNATE 705787.5 580000.1  0 125787.40   0
## 63499  CHIEF EXEC OFFICER - MED CENTR 574187.2 584300.0  0 -10112.88   0
## 250230    PRESIDENT OF THE UNIVERSITY 577650.6 591084.0  0 -13433.44   0
## 119493    DIRECTOR (FUNCTL AREA)-EXEC 725738.8 739694.9  0 -13956.06   0
## 209601    DIRECTOR (FUNCTL AREA)-EXEC 724838.8 739694.9  0 -14856.06   0
```

```
someURL1 <- "http://www.stat.ucla.edu/~vlew/datasets/spssSTUFF.zip"
download.file(someURL1,"spssSTUFF.zip")
unzip("spssSTUFF.zip",exdir = "spssSTUFFdata")
list.files("spssSTUFFdata")
```

```
## [1] "__MACOSX"     "yrbs2013.sav" "yrbss.sav"
```