

# SN

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## EXERCICE 1

### Manipulation des vecteurs

```
# 1.a
a = 0:535
x = a[a %% 3 == 0]

# 1.b
length(x)

## [1] 179

# 1.c
y = x[x %% 5 == 0]

# 1.d
which(x %in% y)

## [1] 1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91
## [20] 96 101 106 111 116 121 126 131 136 141 146 151 156 161 166 171 176

# 1.e
x[(length(x) - 4):length(x)]

## [1] 522 525 528 531 534

# 1.f
Y = matrix(y, nrow = 6, byrow = TRUE)
```

### Manipulation d'une matrice

```

# 2.a
A = matrix(c(1, 0, 1, 1, 0, 1, 1, 1, 2, 3, 0, 1, 0, 0, 0, 1), nrow = 4)

# 2.b
det(A)

## [1] -5

# 2.c
b = c(0, -1, 1, -2)
solve(A, b)

## [1] 0.8 0.2 -0.4 -2.6

# 2.d
C = A[c(-2, -4), -1]
B = cbind(C[, 3], C[, 1], C[, 2])

# 2.e
t(B)

##      [,1] [,2]
## [1,]    0    0
## [2,]    0    1
## [3,]    2    0

```

## EXERCICE 2

```

# 1.
?WorldPhones

## starting httpd help server ... done

# 2.

## 2.a
ncol(WorldPhones)

## [1] 7

## 2.b
nrow(WorldPhones)

## [1] 7

# 3.

## 3.a
names(WorldPhones[1, ])

## [1] "N.Amer" "Europe" "Asia" "S.Amer" "Oceania" "Africa" "Mid.Amer"

## 3.b
names(WorldPhones[, 1])

## [1] "1951" "1956" "1957" "1958" "1959" "1960" "1961"

# 4.
summary(WorldPhones)

```

```
##      N.Amer      Europe      Asia      S.Amer      Oceania
## Min.   :45939   Min.   :21574   Min.   :2876   Min.   :1815   Min.   :1646
## 1st Qu.:62572   1st Qu.:31250   1st Qu.:4969   1st Qu.:2632   1st Qu.:2446
## Median :68484   Median :35218   Median :6662   Median :2845   Median :2691
## Mean   :66748   Mean   :34343   Mean   :6229   Mean   :2772   Mean   :2625
## 3rd Qu.:73918   3rd Qu.:38970   3rd Qu.:7538   3rd Qu.:3072   3rd Qu.:2961
## Max.   :79831   Max.   :43173   Max.   :9053   Max.   :3338   Max.   :3224
##      Africa      Mid.Amer
## Min.    : 89      Min.    : 555.0
## 1st Qu.:1478      1st Qu.: 753.0
## Median :1663      Median : 836.0
## Mean    :1484      Mean    : 841.7
## 3rd Qu.:1837      3rd Qu.: 959.5
## Max.    :2005      Max.    :1076.0
```

```
# 5.
```

```
## 5.a
```

```
apply(WorldPhones, 2, sd)
```

```
##      N.Amer      Europe      Asia      S.Amer      Oceania      Africa      Mid.Amer
## 11277.4625  7195.6169  2124.2146  496.6876  523.0631  647.7070  176.1247
```

```
## 5.b
```

```
apply(WorldPhones, 1, sd)
```

```
##      1951      1956      1957      1958      1959      1960      1961
## 17309.22  22712.46  24362.16  25790.60  27116.58  28712.04  30213.56
```

```
# 6.
```

```
## 6.a
```

```
class(WorldPhones)
```

```
## [1] "matrix" "array"
```

```
## 6.b
```

```
temps = as.integer(names(WorldPhones[, 1]))
```

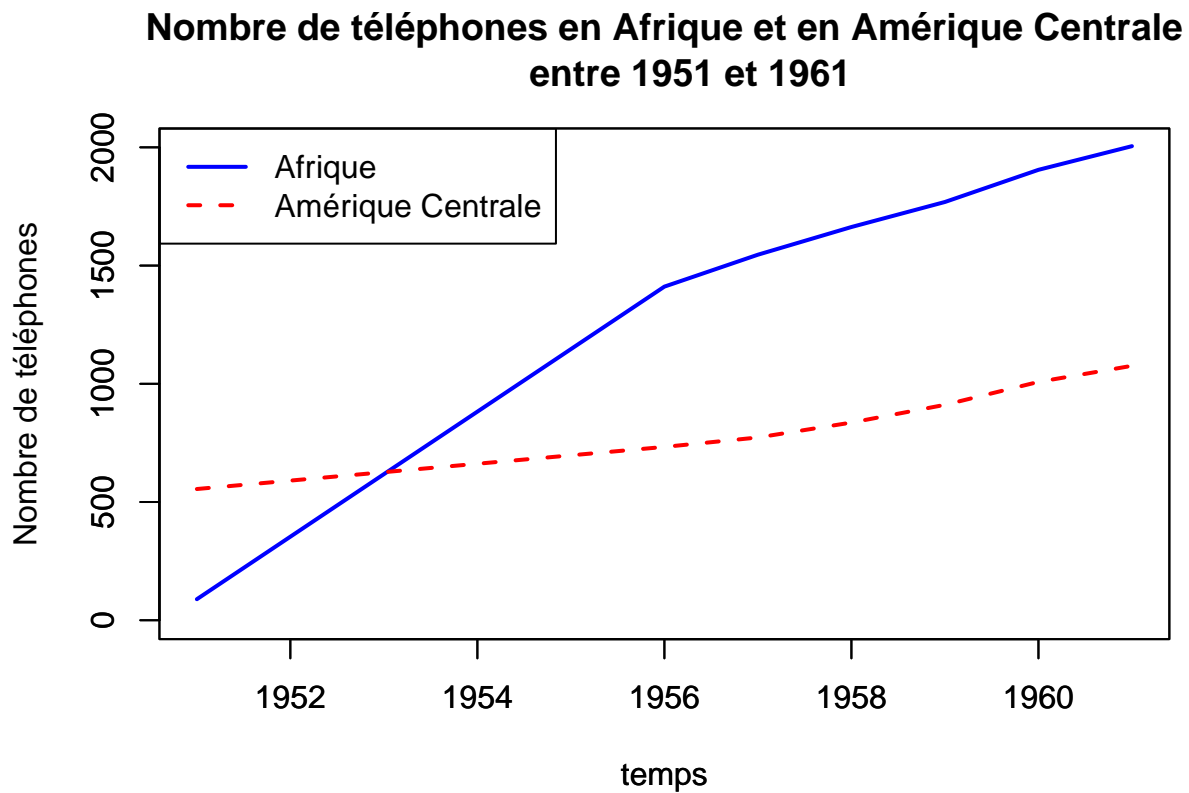
```
## 6.c
```

```
africa = WorldPhones[, "Africa"]
```

```
mid_amer = WorldPhones[, "Mid.Amer"]
```

```
## 6.d
```

```
plot(temps, africa, col="blue", ylab="", ylim=c(0, 2000), type="l", lty=1,
     lwd=2, main="Nombre de téléphones en Afrique et en Amérique Centrale
entre 1951 et 1961")
par(new=TRUE)
plot(temps, mid_amer, col="red", ylab="Nombre de téléphones", ylim=c(0, 2000),
     type="l", lty=2, lwd=2)
legend("topleft", legend=c("Afrique", "Amérique Centrale"), lty=c(1, 2),
     lwd=c(2, 2), col=c("blue", "red"))
```



## EXERCICE 3

```
# 1.
tarif0 = function(age){
  if(age < 0) return("Age invalide")
  if(age <= 11) return("demi-tarif")
  if(age > 65) return("tarif senior")
  return("plein tarif")
}

# 2.
sapply(c(7, 55, 17, 75, 90), tarif0)

## [1] "demi-tarif" "plein tarif" "plein tarif" "tarif senior" "tarif senior"

# 3.
### tarif0 n'est pas vectorisee (structures conditionnelles)

# 4.
tarif = function(ages) return(sapply(ages, tarif0))
tarif(c(7, 55, 17, 75, 90))

## [1] "demi-tarif" "plein tarif" "plein tarif" "tarif senior" "tarif senior"
```