

# Untitled

2021 12 21

#(1)

```
e = rnorm(1000)
```

#(2)

```
t = 1:1000*2*pi/1000
```

```
x1 = sin(t)
```

```
x2 = cos(4*t)
```

#(3)

```
y = 1.5+5*x1+3*x2+e
```

```
X = cbind(x1,x2)
```

```
plot(t,y,col="gray60")
```

#(4)

```
X = cbind(rep(1,1000),x1,x2)
```

#(5)

```
B = cbind(c(1.5,5,3))
```

```
V = as.vector(X %*% B)
```

```
lines(t,V,col="red",lwd=4)
```

#(6)

```
y_ = cbind(y)
```

```
B_ = (solve(t(X) %*% X) %*% t(X) %*% y_)
```

```
B
```

```
##      [,1]
```

```
## [1,]  1.5
```

```
## [2,]  5.0
```

```
## [3,]  3.0
```

```
B_
```

```
##      y
```

```
## 1.569766
```

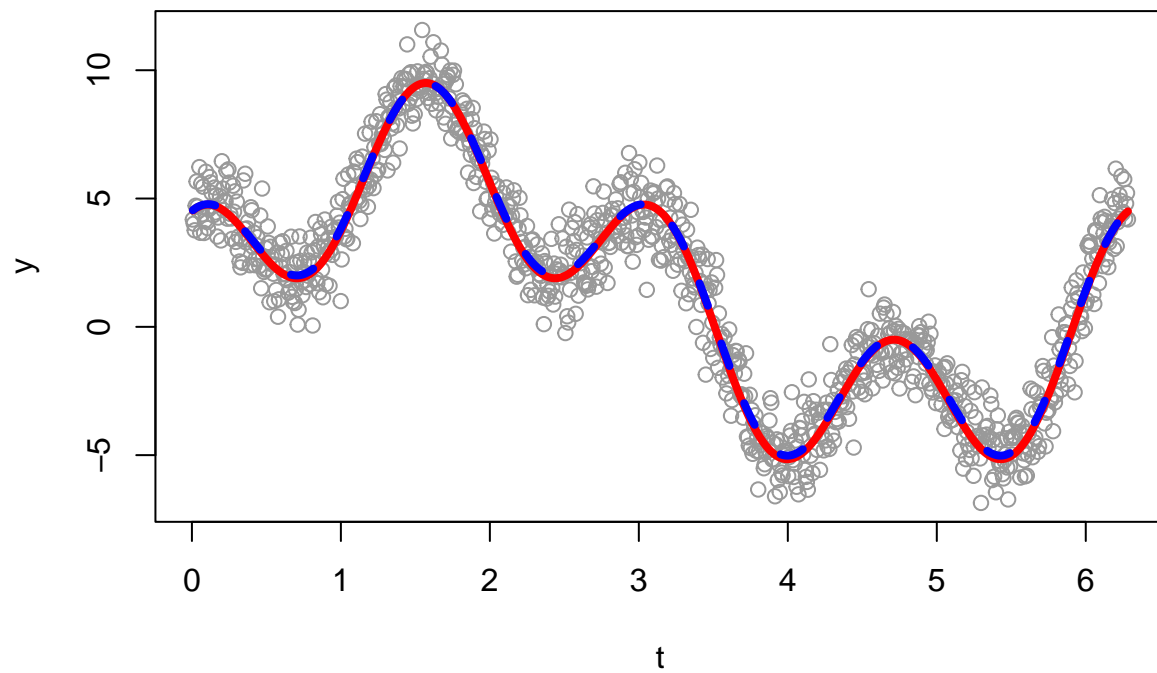
```
## x1 4.979980
```

```
## x2 2.943818
```

```

#(7)
V_ = as.vector(X %*% B_)
lines(t,V_,col="blue",lty="dashed",lwd=4)

```

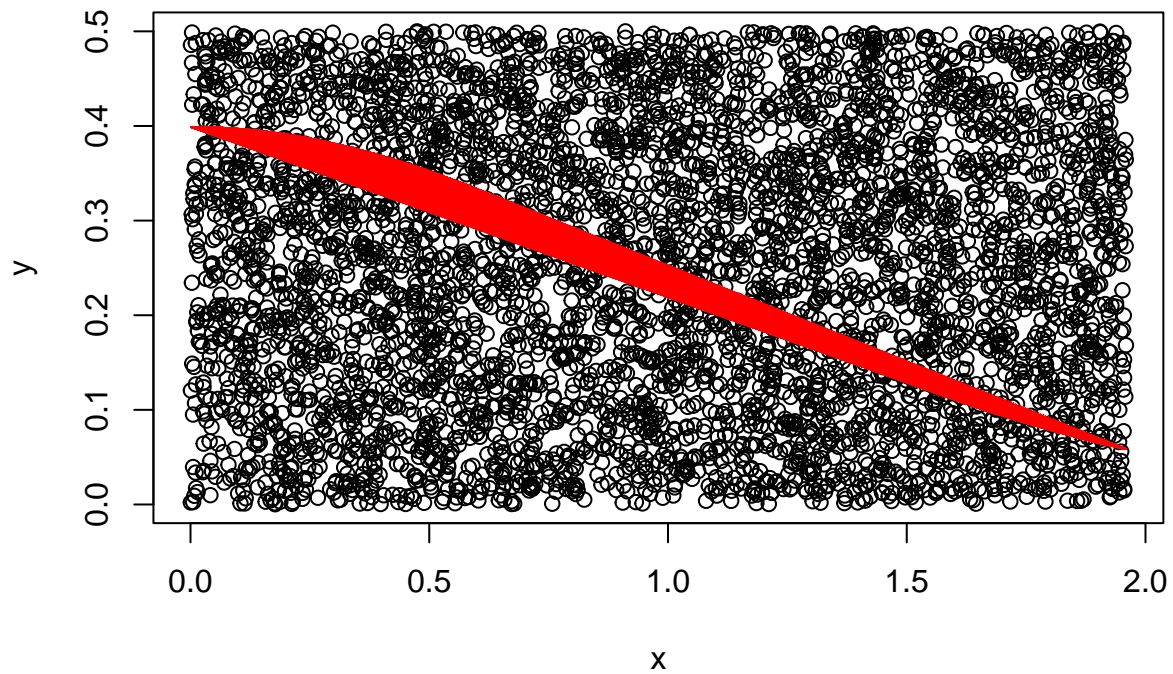


```

##      #(1)

x = runif(5000,0,1.96)
y = runif(5000,0,0.5)
plot(x,y)
lines(x, exp(-x**2/2)/(2*pi)**0.5,col='red')

```



```
a = sum(y <= exp(-x**2/2)/(2*pi)**0.5)
(a/5000)*0.5*1.96*2
```

```
## [1] 0.95256
```

```
 #(2)
```

```
x = rnorm(1000)
sum(x >= -1.96 & x <= 1.96)
```

```
## [1] 943
```

```
###
```

```
# TYPE A
x = rbinom(1000,20,0.5)
sum(x >= 13) / 1000
```

```
## [1] 0.126
```

```
# TYPE B
x=c()
for(i in 1:1000){
```

```

a = rbinom(20,1,0.5)
b = rbinom(20,1,0.95)
c = rbinom(20,1,0.5)
x[i] = min(which(a==0)) +
min(which(b==0)) + min(which(c==0))
}
1-sum(x<=20)/1000

```

```
## [1] 0.418
```

## Type B

```
library(tidyverse) ##COVID19
```

```
library(tidyverse)
```

```
## Warning:   'tidyverse' R    4.1.2
```

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

```

## v ggplot2 3.3.5      v purrr  0.3.4
## v tibble  3.1.6      v dplyr  1.0.7
## v tidyr   1.1.4      v stringr 1.4.0
## v readr   2.1.1      v forcats 0.5.1

```

```
## Warning:   'ggplot2' R    4.1.2
```

```
## Warning:   'tibble' R    4.1.2
```

```
## Warning:   'tidyr' R    4.1.2
```

```
## Warning:   'readr' R    4.1.2
```

```
## Warning:   'purrr' R    4.1.2
```

```
## Warning:   'dplyr' R    4.1.2
```

```
## Warning:   'forcats' R    4.1.2
```

```
## -- Conflicts ----- tidyverse_conflicts() --
```

```

## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

```

```
df=read_csv('https://raw.githubusercontent.com/guebin/2021IR/master/_notebooks/covid19.csv')
```

```
## Rows: 12294 Columns: 5
```

```
## -- Column specification -----
## Delimiter: ","
## chr (1): prov
## dbl (4): year, month, day, cases

##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
head(df)
```

```
## # A tibble: 6 x 5
##   year month   day prov  cases
##   <dbl> <dbl> <dbl> <chr> <dbl>
## 1  2020     1    20     0     0
## 2  2020     1    20     0     0
## 3  2020     1    20     0     0
## 4  2020     1    20     1     1
## 5  2020     1    20     0     0
## 6  2020     1    20     0     0
```

```
##(1)
a = df %>% filter(df$year == 2020)
sum(a$cases)
```

```
## [1] 60726
```

```
b = df %>% filter(df$year == 2021)
sum(a$cases)
```

```
## [1] 60726
```

```
##(2)
a1 = a %>% filter(a$month == 2 & day >=1 & day <=15)
max(a1$prov)
```

```
## [1] " "
```

```
##(3)
a2 = a %>% filter(a$month == 2 & day >=16 & day <=29)
max(a2$prov)
```

```
## [1] " "
```