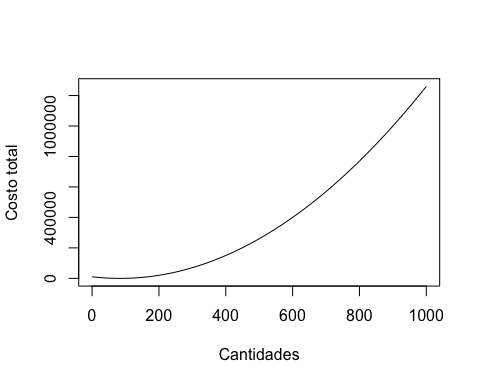
examen

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Ejercicio 1



der\_num <- function(x,f,h=0.01,type=1){  
 if (type==1){  
 derivada <- (f(x+h) - f(x-h))/(2\*h)  
 return(derivada)  
 }else{  
 derivada <- (f(x+h) - f(x))/(h)  
 return(derivada)  
 }  
}  
  
max\_min\_f <- function(x,f,h=0.01,type=1,x0=0,delta = 0.001){  
 derivada <- 1  
 x <- x0  
 while (abs(derivada)>0.001) {  
 derivada <- der\_num(x,f,h,type)  
 x <- x + delta   
 }  
 return(x)  
}  
  
#El valor mínimo para q\* se alcanza en:  
costo <- function(x) 1.5\*x^2-250\*x+10000  
  
min <- max\_min\_f(f=costo,x0=80)  
  
min

## [1] 83.334

#El costo se minimiza en  
  
costo(min)

## [1] -416.6667

Ejercicio 2

integral <- function(f, a, b, n) {  
 if (is.function(f) == FALSE) {  
 stop('f debe ser una función de parámetro variable')  
 }  
   
 h <- (b - a) / n  
   
 j <- 1:n - 1  
   
 xj <- a + j \* h  
   
 approx <- (h / 2) \* (f(a) + 2 \* sum(f(xj)) + f(b))  
   
 return(approx)  
}  
  
#Se calcula el la integral sobre el intervalo [200/3 y 100] (raíces de a función de costo total)  
  
area <- integral(costo,a = 200/3,b=100,n = 10000)

El área bajo la curva de la función de costo es -9259.2591667 > Ejercicio 3

library(quantmod)

## Loading required package: xts

## Loading required package: zoo

##   
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':  
##   
## as.Date, as.Date.numeric

## Loading required package: TTR

## Registered S3 method overwritten by 'quantmod':  
## method from  
## as.zoo.data.frame zoo

## Version 0.4-0 included new data defaults. See ?getSymbols.

#Recolecci?n de datos  
data\_env<-new.env()  
symbols<-c("AMXL.MX", "BIMBOA.MX", "CEMEXCPO.MX", "GMEXICOB.MX","ALFAA.MX")  
inicio<-as.Date("2019-01-01")  
fin<-as.Date("2020-01-01")  
  
getSymbols(Symbols=symbols, env=data\_env, from=inicio,   
 to=fin)

## 'getSymbols' currently uses auto.assign=TRUE by default, but will  
## use auto.assign=FALSE in 0.5-0. You will still be able to use  
## 'loadSymbols' to automatically load data. getOption("getSymbols.env")  
## and getOption("getSymbols.auto.assign") will still be checked for  
## alternate defaults.  
##   
## This message is shown once per session and may be disabled by setting   
## options("getSymbols.warning4.0"=FALSE). See ?getSymbols for details.

## [1] "AMXL.MX" "BIMBOA.MX" "CEMEXCPO.MX" "GMEXICOB.MX" "ALFAA.MX"

Datos<-do.call(merge, eapply(data\_env, Cl ))  
Datos<-Datos[complete.cases(Datos),]  
  
Datos\_rend <- apply(Datos, 2, ROC, type="discrete")  
Datos\_rend <- as.data.frame(Datos\_rend[-1,])  
  
  
###############################  
  
  
r <- 0.049  
T <- 12/12   
dt <- 1/(250\*T)  
n <- as.double(length(Datos$CEMEXCPO.MX.Close))  
trayectorias <- 1000  
suma <- 0  
  
#fechas <- as.Date(index(Datos),tryFormats = c("%Y-%m-%d", "%Y/%m/%d"))  
Calls <- c()  
Sigmas <- c()  
  
  
for(k in 0:5){  
   
 sigma <- 0.15 + k\*0.01  
 suma <- 0  
   
 sigma1 <- sd(Datos\_rend[,1])  
 sigma2 <- sd(Datos\_rend[,2])  
 sigma3 <- sd(Datos\_rend[,3])  
 sigma4 <- sd(Datos\_rend[,4])  
 sigma5 <- sd(Datos\_rend[,5])  
   
 for(j in 1:trayectorias){  
   
 S1 <- as.double(Datos[n,1])  
 S2 <- as.double(Datos[n,2])  
 S3 <- as.double(Datos[n,3])  
 S4 <- as.double(Datos[n,4])  
 S5 <- as.double(Datos[n,5])  
   
 K <- (S1+S2+S3+S4+S5)/5  
   
 for(i in 1:(T\*250)){  
 Z0 <- rnorm(1,0,1)  
 dW <- Z0\*(dt^0.5)  
 dS <- (r\*dt + sigma\*dW)\*S1  
 S1 <- S1 + dS  
   
 Z0 <- rnorm(1,0,1)  
 dW <- Z0\*(dt^0.5)  
 dS <- (r\*dt + sigma\*dW)\*S2  
 S2 <- S2 + dS  
   
 Z0 <- rnorm(1,0,1)  
 dW <- Z0\*(dt^0.5)  
 dS <- (r\*dt + sigma\*dW)\*S3  
 S3 <- S3 + dS  
   
 Z0 <- rnorm(1,0,1)  
 dW <- Z0\*(dt^0.5)  
 dS <- (r\*dt + sigma\*dW)\*S4  
 S4 <- S4 + dS  
   
 Z0 <- rnorm(1,0,1)  
 dW <- Z0\*(dt^0.5)  
 dS <- (r\*dt + sigma\*dW)\*S5  
 S5 <- S5 + dS  
 }  
 funcion\_pago <- max(S1-K, S2-K, S3-K, S4-K, S5-K, 0)   
 suma <- suma + funcion\_pago  
 }  
 esperanza <- suma/trayectorias  
 C <- esperanza\*exp(-r\*T)  
 Calls <- c(Calls,C)  
 Sigmas <- c(Sigmas,sigma)  
   
}  
  
tabla <- data.frame(Sigmas=Sigmas, Calls=Calls)  
#View(tabla)