Computational Statistics (732A90) Exam practice

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Contents

732A90_CompStat_Examination_20170322

Assignment 1

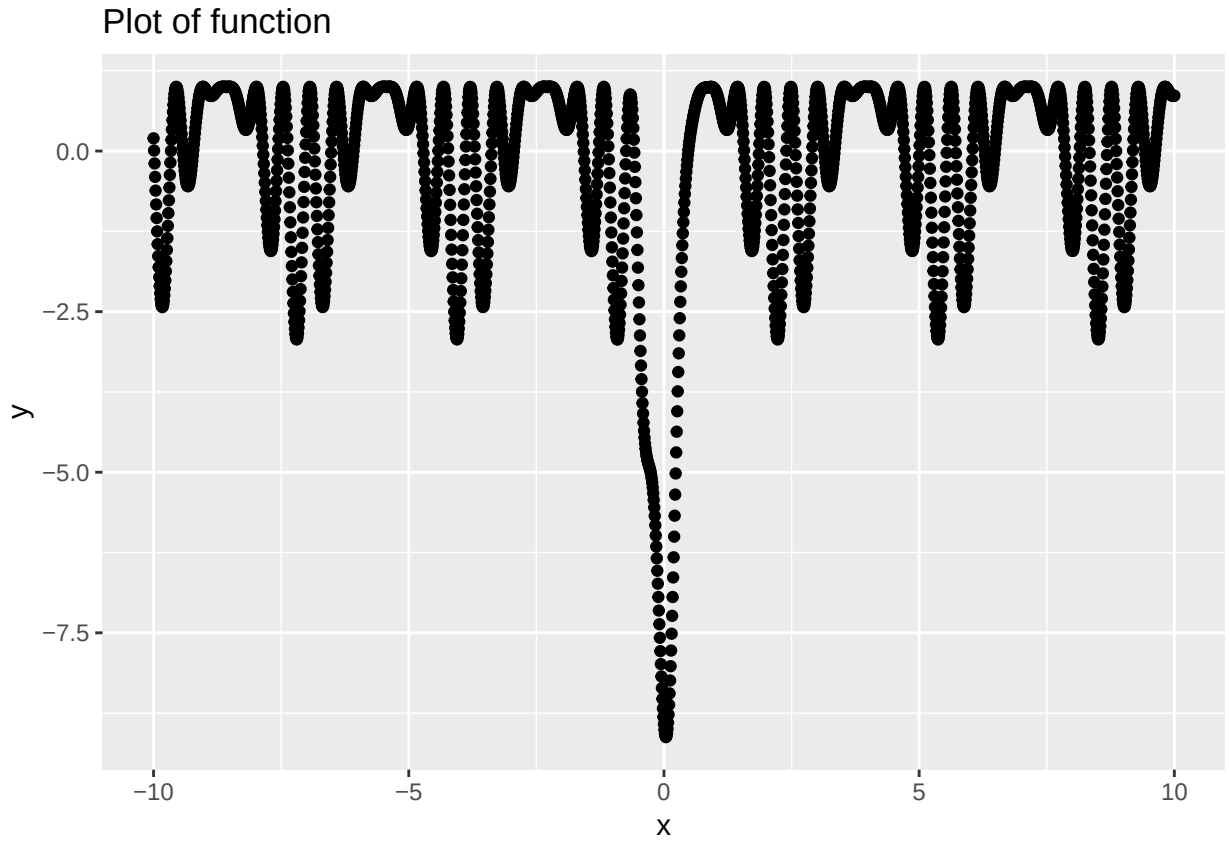
1.1 Plot of function

```
function_f <- function(x){

answer <- 1 - (sin(5*x) + cos(7*x))^2 - 5 * 1/(sqrt(pi*0.1)) * exp(-x^2/(0.1))
return(answer)
}

grad_f <- function(x){
answer <- -2*(sin(5*x) + cos(7*x)) *(5*cos(5*x)-7*sin(7*x))-5*(1/sqrt(0.01 * pi)) * exp(-x^2 * 10) * (-1
return(answer)
}


temp_x <- seq(-10,10,0.01)
temp_y <- function_f(x=temp_x)
temp_data <- data.frame(x = temp_x, y = temp_y)
ggplot(data=temp_data, aes(x=x,y=y)) + geom_point() + ggtitle("Plot of function")
```



1.2

```
optim(par=-10, fn=function_f, upper = 2, lower = -2, method = c("Nelder-Mead"))
```

```
## Warning in optim(par = -10, fn = function_f, upper = 2, lower = -2, method
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## Brent)
```

```
## $par
## [1] 1.722025
##
## $value
## [1] -1.557307
##
## $counts
## function gradient
##       15       15
##
## $convergence
## [1] 0
##
## $message
## [1] "CONVERGENCE: REL_REDUCTION_OF_F <= FACTR*EPSMCH"
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## $par
## [1] 0.03947173
##
## $value
## [1] -9.124026
##
## $counts
## function gradient
##        7        7
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```
## $par
## [1] 2
##
## $value
## [1] 0.8341198
##
## $counts
```

```
## function gradient
##        1        1
##
## $convergence
## [1] 0
##
## $message
## [1] "CONVERGENCE: NORM OF PROJECTED GRADIENT <= PGTOL"
```

BFGS

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optim(par=-10, fn=function_f, upper = 2, lower = -2, method =c("BFGS"))
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CG

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SANN

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optim(par=-10, fn=function_f, upper = 2, lower = -2, method = c("SANN"))
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1.3

```
optim(par=-10, fn=function_f, gr=grad_f, upper = 2, lower = -2, method = c("Nelder-Mead"))
```

```
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```

```
## $par
## [1] 0.01603139
##
## $value
## [1] -9.050729
##
## $counts
## function gradient
##       36       36
##
## $convergence
## [1] 0
##
## $message
## [1] "CONVERGENCE: REL_REDUCTION_OF_F <= FACTR*EPSMCH"
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1.4