exercise_3

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2020/3/20

```
# load data
rm(list = ls())
mydata <- read.csv("data/xy.csv")
x <- mydata$x
y <- mydata$y
```

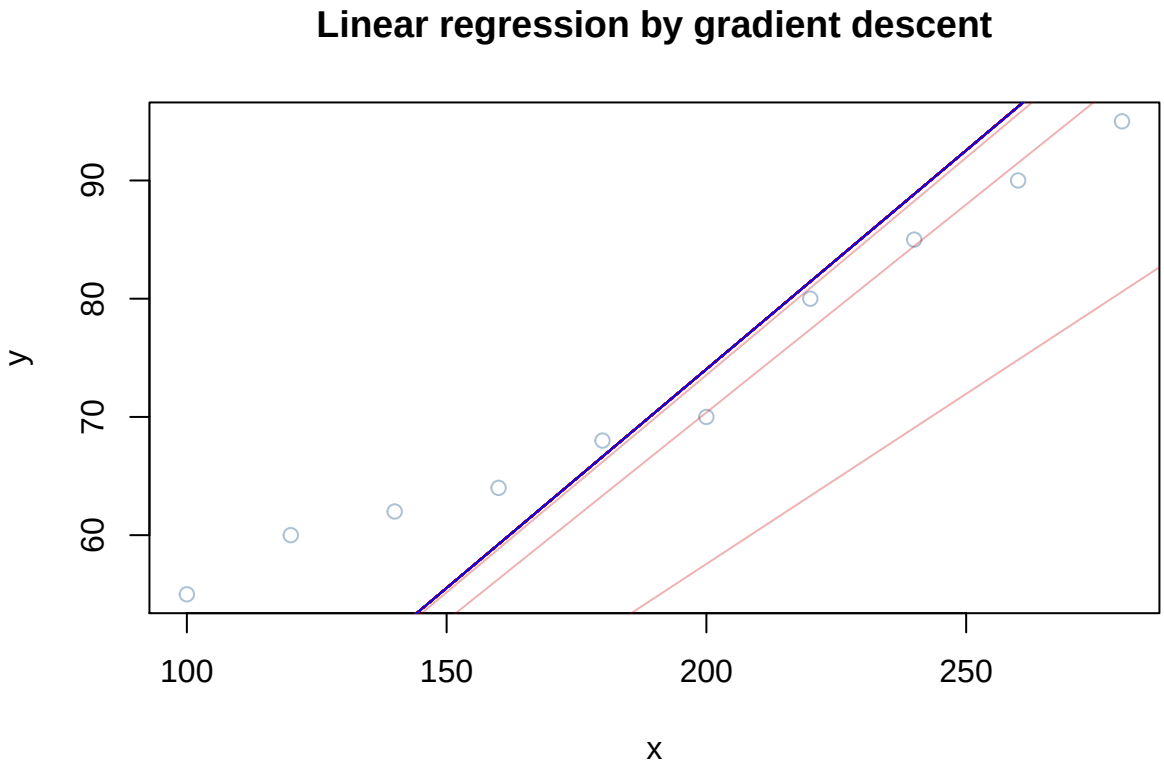
```
# define cost function
cost <- function(X, y, theta) {
  sum( (X %*% theta - y)^2 ) / (2*length(y))
}
```

```
# Setting parameters
alpha <- 0.00001
num_iters <- 1000
cost_history <- rep(0,num_iters) # record cost
theta_history <- list(num_iters) # record theta
theta <-  matrix(c(0,0), nrow = 2) # initialize theta
X <- cbind(1,x)
```

```
# gradient descent
for (i in 1:num_iters) {
  theta[1] <- theta[1] - alpha * (1/length(y)) * sum(((X%*%theta)- y))
  theta[2] <- theta[2] - alpha * (1/length(y)) * sum(((X%*%theta)- y)*X[,2])
  cost_history[i] <- cost(X, y, theta)
  theta_history[[i]] <- theta
}
print(theta)
```

```
##             [,1]
## [1,] 0.02738687
## [2,] 0.37007117
```

```
# scatter plot
plot(x,y, col=rgb(0.2,0.4,0.6,0.4), main='Linear regression by gradient descent')
# plot line
for (i in c(1,3,6,10,14,seq(20,num_iters,by=10))) {
  abline(coef=theta_history[[i]], col=rgb(0.8,0,0,0.3))
}
abline(coef=theta, col='blue')
```


Linear regression by gradient descent
y
60
70
80
90
100
150
200
250
x