1.

```
mylm <- function(y,X){
    D = cbind(1,X)
    beta = solve(t(D) %*% D) %*% t(D) %*% y
    fitted = D %*% beta
    residuals = y - fitted
    result = list(beta = beta,
                  fitted = fitted,
                  residuals = residuals)
    return(result)
}
```

2.

```
test.X = cbind(sample(1:100),sample(1:100),sample(1:100))
beta = c(5,-1,4,2)
test.y = cbind(1,test.X) %*% beta + rnorm(100)
model = lm(test.y~test.X)
mymodel = mylm(test.y,test.X)
c(sum(abs(model$coefficients - mymodel$beta)),
  sum(abs(model$fitted.values - mymodel$fitted)),
  sum(abs(model$residuals - mymodel$residuals))
 )
```

```
## [1] 1.096900e-13 2.499334e-11 2.488536e-11
```