

1.

```
mylm <- function(y,X){  
  # Transform to matrix  
  Y = as.matrix(Y); Xnew = as.matrix(X)  
  
  # Check if numeric  
  if(!is.numeric(Y) | !is.numeric(Xnew))  
    stop("Y or X is not numeric!\n")  
  # Check for dimensions  
  dy = dim(Y) ; dx = dim(Xnew)  
  if(dy[2] != 1 | dy[1] != dx[1])  
    stop("Y or X has wrong dimensions\n")  
  # Check for ill conditioned elements.  
  # We can use is.finite to response only to finite real numbers  
  if(FALSE %in% is.finite(Y) | FALSE %in% is.finite(Xnew))  
    warning("Y or X is ill conditioned\n")  
  # Check if of full rank  
  D = cbind(1,Xnew)  
  DtD = t(D) %*% D  
  if(det(DtD) == 0)  
    stop("Design matrix is not full rank\n")  
  
  # Regressing  
  DtD.inv = solve(DtD)  
  hat.matrix = D %*% DtD.inv %*% t(D)  
  beta = DtD.inv %*% t(D) %*% Y  
  fitted = D %*% beta  
  residuals = Y - fitted  
  SS.tot = sum((Y - mean(Y))^2)  
  if(SS.tot == 0)  
    warning("Y is constant!\n")  
  SS.res = sum((Y - fitted)^2)  
  SS.reg = SS.tot - SS.res  
  R2 = SS.reg / SS.tot  
  # Return result  
  result = list(beta = beta,  
                fitted = fitted,  
                residuals = residuals,  
                R2 = R2,  
                hatdiag = diag(hat.matrix))  
  return(result)  
}
```

2.

```
data = read.table("HW2ex.txt")  
shape = dim(data)  
  
Y = data[,1]; X = data[,2:shape[2]]  
  
results = mylm(Y,X)  
plot(results$fitted, results$residuals, pch='.')
```

