Exercise – Function – Least squares statistics

This function calculates OLS statistics. The input arguments of the function are y and X. y is a N by 1 vector, and X is an N by K matrix. The output argument of the function is LSS. It is a structure array that contains the calculated least squares statistics. The expression in line 14 is called the "mean squared error". The expression in line 15 is the estimator of the standard deviation of the regression error. It is called the standard error of the regression. It is also referred to as the "root mean squared error". Line 17 is the variance-covariance estimator of the OLS estimator.

```matlab
function LSS = exercisefunctionlss(y,X)
%% Number of observations and column dimension of X
LSS.N                   = length(y);
LSS.K                   = size(X,2);
%% Coefficient estimates, predictions, residuals
LSS.B_hat               = (X'*X)\X'*y; % Or inv(X'*X)*X'*y;
LSS.y_hat               = X*LSS.B_hat;
LSS.u_hat               = y-LSS.y_hat;
%% Residual sum of squares
LSS.RSS                 = LSS.u_hat'*LSS.u_hat;
%% The estimator of the variance of the regression error
LSS.sigma_hat_squared = LSS.RSS/(LSS.N-LSS.K);
LSS.sigma_hat           = sqrt(LSS.sigma_hat_squared);
%% The variance-covariance estimator of the OLS estimator
LSS.B_hat_VCE           = LSS.sigma_hat_squared.*inv(X'*X);
LSS.B_hat_SEE           = sqrt(diag(LSS.B_hat_VCE));
end
```