Assignment 1

2022-10-01

Question 4

a) Using the parametrization $\mu = 0$:

```
data("iris");

Y <- iris[order(iris$Species), "Sepal.Width"];

X <- diag(3) %x% rep(1, 50);
```

Then we calculate the estimated $\hat{\beta} = (X^T X)^{-1} X^T Y$ as

```
beta = (t(X) %*% X) %>% solve() %*% t(X) %*% Y;
```

The residual sum of squares S_Ω and S_ω of the full and reduced models respectively are

```
s1 = norm(Y - X %*% beta)^2;
s2 = norm(Y - matrix(rep(1, 150),ncol=1) * mean(Y))^2;
```

The unbiased estimator of σ^2 is $\frac{S_\Omega}{n-1} = 1537.894656$ and $\frac{S_\omega}{n-1} = 2552.0009671$.

```
unb_est = s1/(150 - 1);
```