IEOR 142 HW 1

① a) $\hat{\beta} = \arg\min \beta$

$$\sum_{i=1}^{n} (y_1 - B_0 - B_1 X_1 \dots B_B X_{1p})^2$$

b) $\hat{\alpha} = \arg\min \sum (y_i - \alpha_0 - \alpha_i - \lambda_1 x_{ij}$

$$\dots \alpha_p \lambda_p x_{ip})^2$$

You compare a + b to evaluate the relationship between alpha and beta
α β

②
$$\sum_{i=1}^{n} (w_i - \alpha_0 - \alpha_1 z_{i1} - \dots \alpha_p z_{ip})^2$$

$$w_i = y_i - \bar{y} \quad z_{ij} = x_{ij} - \bar{x}_i$$

$$\Rightarrow \sum_{i=1}^{n} (y_i - \bar{y} - \alpha_0 - \alpha_1 (x_{i1} - \bar{x}_1) - \dots$$
$$\alpha_p (x_{ip} - \bar{x}_p))^2$$

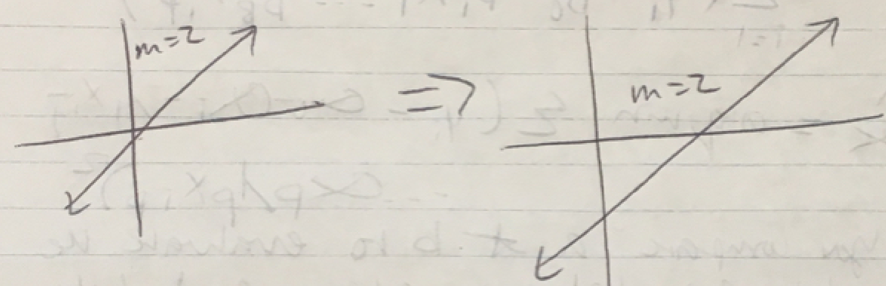
$$\sum_{i=1} \left(y_i - \alpha_1 x_{i1} - \alpha_2 x_{i2} - \dots \alpha_p \cdot x_{ip} - \bar{y} - \alpha_1 \bar{x}_1 - \alpha_2 x_2 \dots - \alpha_p \cdot x_{ip} - \alpha_0 \right)^2$$

$$\bar{y} = \frac{1}{n} \sum y_i \quad \bar{x}_j = \frac{1}{n} \sum x_{ij}$$

$$\Rightarrow \alpha_0 = 0 ; - \sum \alpha_j = 0$$

2a) $-\Sigma(\alpha_2 x_{i2})$

b) The coeff estimates do not change because they measure the fit of the line, not the position on the x-axis.



slope is the same

c) First pre process the data so that it is centered in the same way as the existing data, then plug in Xnew to model the predictions.