1.5 The Normal Equations

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$$\frac{dSSR}{d\beta_j} = -2\sum_i (y_i - \bar{y})\, x_{ij} = 0$$

$$\sum \hat{r}_i \cdot x_{ij} = 0$$

$j = 0 \quad x_{i0} = 1$

$$\sum \hat{r}_i = 0$$

$$\text{Corr}(x_{ij}, r_i) = 0$$

$$\bar{Y}/n = (\sum \tilde{\beta}_0 + \beta_1 x_1 + \tilde{\beta}_2 x_2 + \dots)/n$$

$$\bar{y} = \hat{\beta}_0 + \hat{\beta}_1 \bar{x}_1 + \hat{\beta}_2 \bar{x}_2 + \dots$$

Choose $\hat{\beta}_0$ so line passes through sample mean