y_i (i=1,..., n)
e4.1

$$y_i = x_i^{(1)}\beta_1 + ... + x_i^{(p)}\beta_p + \varepsilon_i$$

e4.2

$$\varepsilon \approx N(0, \sigma^2)$$

$x_i^{(1)}, ..., x_i^{(p)}$ $(p < n$
$\beta_1, ..., \beta_p$
$\mathbf{x}_i = (x_i^{(1)}, ..., x_i^{(p)})'$
$\beta = (beta_1, ..., \beta_p)'$
e4.3

$$y_i = \mathbf{x_i'}\beta + \varepsilon_i$$

e4.4

$$E(y_i) = \mu_i = \mathbf{x_i'}\beta$$
$$Var(y_i) = \sigma^2$$

$$\mathbf{y} \equiv \begin{pmatrix} y_1 \\ \vdots \\ y_n \end{pmatrix}$$

e4.6

$$\mathbf{X} \equiv \begin{pmatrix} x_1' \\ \vdots \\ x_n' \end{pmatrix} = \begin{pmatrix} x_1^{(1)} & x_1^{(2)} & ... & x_1^{(p)} \\ \vdots & \vdots & ... & \vdots \\ x_n^{(1)} & x_n^{(2)} & ... & x_n^{(p)} \end{pmatrix} \equiv (\mathbf{x}^{(1)}\mathbf{x}^{(2)}...\mathbf{x}^{(p)})$$

e4.7

$$\mathbf{y} = \mathbf{X}\beta + \varepsilon$$

e4.8

$$\varepsilon \approx N_n(\mathbf{0}, \mathbf{R})$$

4.3 Offset
e4.9

$$y_i = x_i^{(0)} + x_i^{(1)}\beta_1 + ... + x_i^{(p)}\beta_p + \varepsilon_i,$$

4.10

$\mathbf{x}^(0) \equiv (x_1^{(0)}, ..., x_n^{(0)})$
4.4 Estimation
4.4.1 Ordinary Least Squares
4.11

$$\sum_{i=1}^{n}(y_i - \mathbf{x_i'}\beta))^2$$