Let us assume the normality $Y_i \sim N(\mu_i, \sigma^2)$.

(a) Model the expected value μ_i by the second degree polynomial model

$$\mu_i = \beta_0 + \beta_1 x_i + \beta_2 x_i^2.$$

Calculate the maximum likelihood estimate for the parameter β_2.

(b) Model the expected value μ_i by the exponential model

$$\mu_i = e^{\beta_0} x_i^{\beta_1}.$$

Calculate the maximum likelihood estimate for the expected value μ_{i_*}, when $x_{i_*} = 150$.

(c) Model the expected value μ_i by the asymptotic regression, SSasymp, model

$$\mu_i = \beta_0 + (\beta_1 - \beta_0) e^{(-e^{\beta_2} x_i)},$$

where $\beta_0, \beta_1, \beta_2$ are unknown parameters. Calculate the maximum likelihood estimate for the parameter β_0.

(d) Model the expected value μ_i by the Michaelis-Menten, SSmicmen, model

$$\mu_i = \frac{\beta_1 x_i}{\beta_0 + x_i},$$

where β_0, β_1 are unknown parameters. Calculate the maximum likelihood estimate for the expected value μ_{i_*}, when $x_{i_*} = 150$.

(e) Consider again the asymptotic regression, SSasymp, model

$$\mu_i = \beta_0 + (\beta_1 - \beta_0) e^{(-e^{\beta_2} x_i)}.$$

Create 80% prediction interval for new observation y_f, when $x_f = 150$.