

### Home Work 5-1

1. A chemical engineer studied the effect of the amount of surfactant ( $x_1$ ) and time ( $x_2$ ) on clathrate formation ( $y$ ). Clathrates are used as cool storage media. File dat\_Table\_B8.xlsx summarizes the experimental results.

- a. Fit a multiple linear regression model relating clathrate formation to these regressors.
- b. Construct a normality plot of the residuals from the full model. Does there seem to be any problem with the normality assumption?
- c. Construct and interpret a plot of the residuals versus the predicted response.
- d. Perform a thorough influence analysis (any influential points) of the clathrate formation model.
- e. Perform a thorough residual analysis of these data.
- f. Identify any appropriate transformation for these data. Fit this model and compare.

2. The kinematic viscosity ( $y$ ) of a certain solvent system depends on the ratio of the two solvents ( $x_1$ ) and the temperature ( $x_2$ ). File data\_Table\_B10.xlsx summarizes a set of experimental results.

- a. Fit a multiple linear regression model relating the viscosity to the two regressors.
- b. Construct a normality plot of the residuals from the full model. Does there seem to be any problem with the normality assumption?
- c. Construct and interpret a plot of the residuals versus the predicted response.
- d. Compute the PRESS statistic for the model and interpret it.
- e. Perform a thorough influence analysis (any influential points) for the model.
- f. Perform a thorough residual analysis of these data.