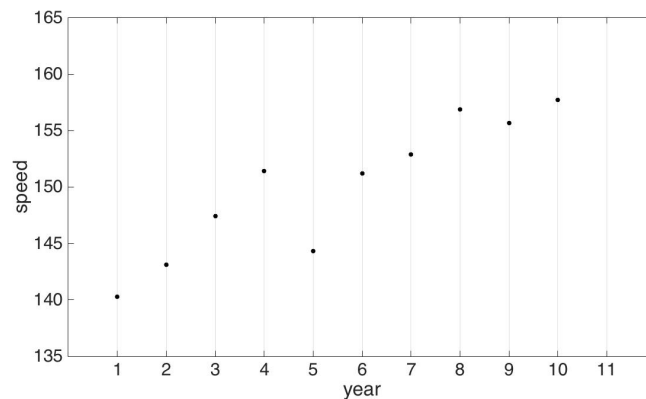


## Problem on linear regression

We wish to predict  $y$ , winning speeds (in mile per hour) in a car race, given the year  $x$ , by a linear regression  $y = \beta_0 + \beta_1 x + \epsilon$ . The data for years one to ten are

$$y = \{140.3, 143.1, 147.4, 151.4, 144.3, 151.2, 152.9, 156.9, 155.7, 157.7\}.$$



Assume normally distributed errors  $\epsilon_i$  in the regression model and address the following points.

- Find maximum likelihood estimates for  $\beta_0$  and  $\beta_1$  (that is least squares estimates).
- Assess the goodness of fit by computing the coefficient of determination  $R^2$ .
- Predict the winning speed for year  $x = 11$  and provide a 95% prediction interval for your prediction.

Summaries:

$$\bar{X} = 5.5; \quad \bar{Y} = 150.09; \quad \bar{X}^2 = 38.5; \quad \bar{Y}^2 = 22560.21; \quad \bar{XY} = 840.68$$

