

13.4 HEUN'S METHOD

Euler's method is the simplest of all one-step methods. It does not require any differentiation and is easy to implement on computers. However, its major weakness is large truncation errors. This is due to its linear characteristic. Recall that Euler's method uses only the first two terms of the Taylor series. In this section, we shall consider an improvement to Euler's method.

In Euler's method, the slope at the beginning of the interval is used to extrapolate y_i to y_{i+1} over the entire interval. Thus,

$$y_{i+1} = y_i + m_1 h$$

where m_1 is the slope at (x_i, y_i) . As illustrated in Fig. 13.2, y_{i+1} is clearly an underestimate of $y(x_{i+1})$.

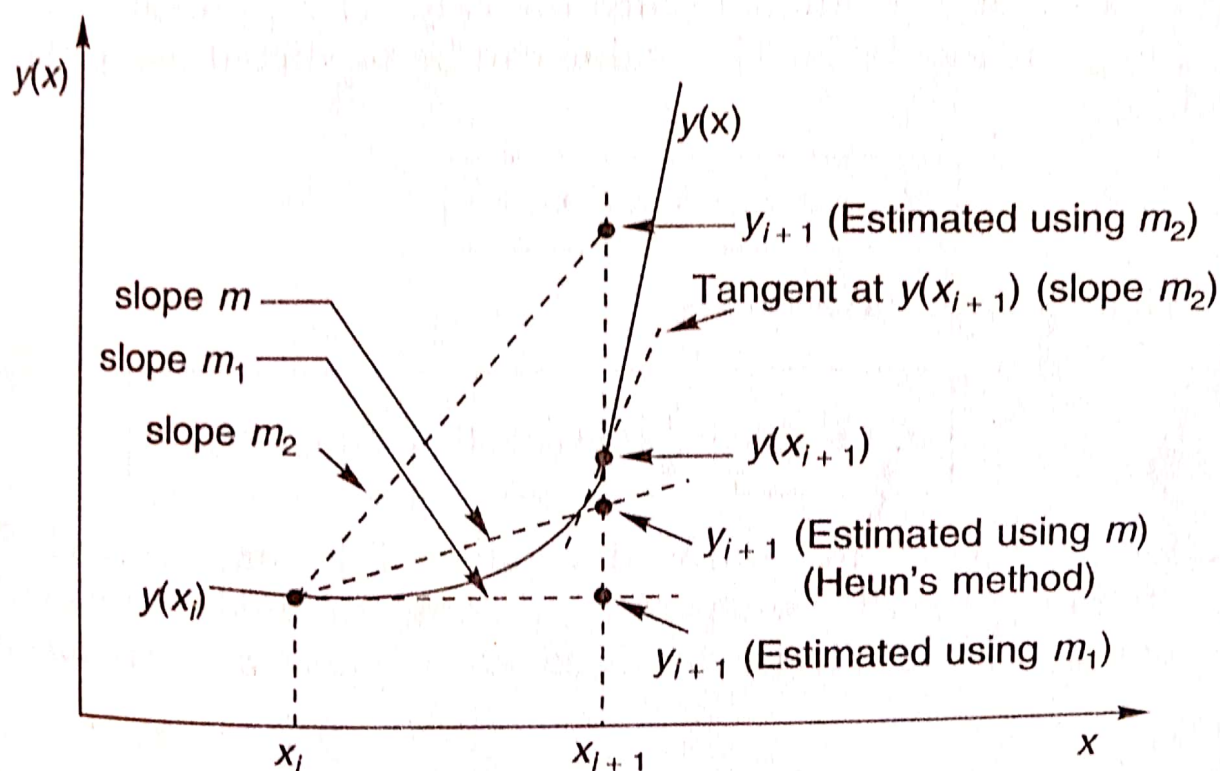


Fig. 13.2 Illustration of Heun's method