

- Error Estimation when  $f(x)$ -unknown:

The Next-term Rule

Often  $f(x)$  is not known, and consequently we do not know bound for  $f^{(n+1)}(\xi)$ .

As we saw

$$\frac{f^{(n+1)}(\xi)}{(n+1)!} = f[x_0, \dots, x_{n+1}]$$

Thus the  $(n+1)^{\text{st}}$  DD is an estimate for the  $(n+1)^{\text{st}}$  derivative of  $f$ . This means that the error of the interpolation is given approximately by the value of the next term that would be added

$E_n(x, f) \approx$  the value of the next term that would be added to  $P_n(x)$

Thus,

$$E_1(1.75; x^2 e^{-\frac{x}{2}}) \approx -0.1755(1.75-1.1)(1.75-2) = 0.02852$$