

Ex: Construct the interpolating polynomial of degree 4 using Newton's backward divided-difference formula using the data in Ex 1.

$$P(x) = -4.28172 + 2.2404(x-1) + 0.9517(x-1)(x-0.6) + 0.278(x-1)(x-0.6)(x-0.3) + 0.063(x-1)(x-0.6)(x-0.3)(x-0.1).$$

4) Error of interpolation with Divided Differences

The n th degree polynomial generated by divided differences is the same as the one generated by Lagrange interpolation. Thus the error is the same.

$$E_n(x; f) = \frac{f^{(n+1)}(\xi)}{(n+1)!} (x-x_0) \dots (x-x_n)$$

Recall $E_n(x; f) = f(x) - P_n(x)$

Ex. For the function $f(x) = x^2 e^{-\frac{x}{2}}$ construct the divided difference table at the points

$$x_0 = 1.1 \quad x_1 = 2 \quad x_2 = 3.5 \quad x_3 = 5 \quad x_4 = 7.1$$

Find the Newton's forward divided