

Let $p[f|x_0, \dots, x_n]$ be the IP of $f(x)$:

$$\begin{aligned}
 \int_a^b f(x) dx &\approx \int_a^b p[f|x_0, \dots, x_n] dx \\
 &= \int_a^b \sum_{j=0}^n \hat{L}_j^n(x) \cdot f(x_j) dx \\
 &= \sum_{j=0}^n \underbrace{\int_a^b \hat{L}_j^n(x) dx}_{QW} \cdot f(x_j) \\
 &= \sum_{j=0}^n w_j \cdot f(x_j) = Q[F]
 \end{aligned}$$

\uparrow
 \uparrow
 QW
 QN

Rem.: The QW s do NOT depend on f !

For given QNs x_j compute them once and tabulate for posterity

\leadsto for equally spaced QNs over $I=[a, b]$ this leads to so-called

Newton-Cotes QRs