

Ex 4.4

Q1

a) $\int_1^2 x \ln x \, dx$, $n=4$

$h = 0.5$

$$\int_1^2 x \ln x \, dx \approx \frac{0.5}{2} \left[f(1) + 2f(1.25) + 2f(1.5) + 2f(1.75) + f(2) \right]$$

$$\approx \frac{1}{8} \times 5.119182 = 0.63989$$

$$d) \int_0^{\pi} x^2 \cos x \, dx, \quad n=6 \quad h=\frac{\pi}{6}$$

$$\int_0^{\pi} x^2 \cos x \, dx \approx \frac{\pi}{12} \left[f(0) + 2f\left(\frac{\pi}{6}\right) + 2f\left(\frac{\pi}{3}\right) + \right.$$

$$\left. 2f\left(\frac{\pi}{2}\right) + 2f\left(\frac{2\pi}{3}\right) + \right.$$

$$\left. + 2f\left(\frac{5\pi}{6}\right) + f(\pi) \right] \approx -6.428672$$

Q3

a) $\int_1^2 x \ln x \, dx, n=4$

$h = 0.25$

$$\int_1^2 x \ln x \, dx \approx \frac{0.25}{3} [f(1) + 4f(1.25) + 2f(1.5) + 4f(1.75) + f(2)]$$

$$\approx \frac{0.25}{3} \times 7.63568 = 0.636066$$

$$d) \int_0^{\pi} x^2 \cos x \, dx, \quad n=6 \quad h = \frac{\pi}{6}$$

$$\begin{aligned} \int_0^{\pi} x^2 \cos x \, dx &\approx \frac{\pi}{18} \left[f(0) + 4f\left(\frac{\pi}{6}\right) + 2f\left(\frac{\pi}{3}\right) \right. \\ &\quad \left. + 4f\left(\frac{\pi}{2}\right) + 2f\left(\frac{2\pi}{3}\right) + \right. \\ &\quad \left. 4f\left(\frac{5\pi}{6}\right) + f(\pi) \right] \\ &\approx \frac{\pi}{18} (-31.12718) = -5.432 \end{aligned}$$