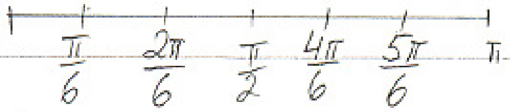
(b) Set up a composite Simpson's rule with $n=6$ to approximate the integral

$$\int_a^b f(x)\,dx = \frac{h}{3}\left[f(a) + 4f(x_1) + 2f(x_2) + \cdots + 4f(x_{n-1}) + f(b)\right]$$



$$h = \frac{\pi}{6}$$

$$\int_0^{\pi} x^2 \cos x\,dx \approx \frac{\pi}{6\cdot 3}\left[0 + 4\left(\frac{\pi}{6}\right)^2 \cos\frac{\pi}{6} + 2\left(\frac{\pi}{3}\right)^2 \cos\frac{\pi}{3}\right.$$

$$+ 4\cos\left(\frac{\pi}{2}\right)^2 \cos\frac{\pi}{2} + 2\left(\frac{2\pi}{3}\right)^2 \cos\left(\frac{2\pi}{3}\right) + 4\left(\frac{5\pi}{6}\right)^2 \cos\frac{5\pi}{6}$$

$$\left. + (\pi^2)\cos\pi\right]$$

Ex. Approximate the integral

$$\int_1^{\frac{3}{2}} x^2 \ln x\,dx$$

using Gaussian quadrature with $n=4$.

Solution: To use Gaussian quadrature we need to change the variables so

$$\int_1^{\frac{3}{2}} \longrightarrow \int_{-1}^{1}$$