1.

$$\int_0^{2\pi} \operatorname{sen}(x/2)\, dx$$

$\Delta x = \frac{2\pi}{8}$ $\Delta x = \frac{\pi}{4}$

i	x_i	$f(x_i)$
0	0	0
1	$\pi/4$	0.3826
2	$\pi/2$	0.7071
3	$3\pi/4$	0.9238
4	π	1
5	$5\pi/4$	0.9238
6	$3\pi/2$	0.7071
7	$7\pi/4$	0.3826
8	2π	0

$$S_8 = \frac{\pi/4}{3}\,(0 + 4(0.3826) + 2(0.7071) + 4(0.9238) + 2(1) + 4(0.9238) + 2(0.7071) + 4(0.3826) + 0)$$

$S_8 = 4.0001$

2.

$$E_S \leq \frac{K(b-a)^5}{180n^4}$$

$$\frac{K(b-a)^5}{180n^4} \leq 10^{-5}$$

$$\frac{K(b-a)^5}{180(10^5)} \leq n^4$$

$$\sqrt[4]{\frac{K(2\pi)^5}{180(10^{-5})}} \leq n$$

$$f^{(1)}(x) = \frac{\cos\left(\frac{x}{2}\right)}{2} \qquad f^{(2)}(x) = -\frac{\operatorname{sen}\left(\frac{x}{2}\right)}{4}$$

$$f^{(3)}(x) = -\frac{\cos\left(\frac{x}{2}\right)}{8} \qquad f^{(4)}(x) = \frac{\operatorname{sen}\left(\frac{x}{2}\right)}{16}$$

$K = 1/16$

$$\sqrt[4]{\frac{1/16(2\pi)^5}{180(10^{-5})}} \leq n$$

$n = 23.9025$

$n \approx 24$