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

$$\int_0^{2\pi} 1 - \left(\frac{1}{2} + \frac{1}{2}\cos(2x)\right)dx$$

$$\int_0^{2\pi} 1 - \frac{1}{2} - \frac{1}{2}\cos(2(2x))\,dx$$

$$\int_0^{2\pi} \frac{1}{2}\,dx - \frac{1}{2}\int_0^{2\pi} \cos(4x)\,dx$$

$$\frac{1}{2}x - \frac{1}{2}\operatorname{sen}(4x)\Big|_0^{2\pi}$$

$$\frac{1}{2}(2\pi - 0) - \frac{1}{2}\left[\operatorname{sen}(8\pi) - \operatorname{sen}(0)\right]$$

$$= \frac{1}{2}(2\pi) = \pi$$

Identidades trigonométricas

$\operatorname{sen}^2(x) + \cos^2(x) = 1$

$\operatorname{sen}^2(x) = 1 - \cos^2(x)$

$1 - \cos^2(x)$

$\cos^2(x) = \frac{1}{2} + \frac{1}{2}\cos(2x)$

$\frac{1}{2} + \frac{1}{2}\cos(2x)$

$\operatorname{sen}(\pi) = 0$

$\operatorname{sen}(2\pi) = 0$

$\operatorname{sen}(3\pi) = 0$

$\operatorname{sen}(0) = 0$

$\operatorname{sen}(n\pi) = 0$