Integral Indefinida - Cambio de variable

Bytellant

$$\int \operatorname{sen}^5(x)\cos^2(x)\,dx$$

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

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

$$\int \left(1-\cos^2(x)\right)^2 \operatorname{sen}(x)\cos^2(x)\,dx$$

$u = \cos(x)$

$du = \operatorname{sen}(x)\,dx$

$dx = \dfrac{du}{\operatorname{sen}(x)}$

$$\int (1-u^2)^2 \operatorname{sen}(x)\, u^2 \frac{du}{\operatorname{sen}(x)}$$

$$\int (1-u^2)^2 u^2\,du = \int (1-2u^2+u^4)\,u^2\,du$$

$$\int u^2 - 2u^4 + u^6\,du$$

$$* \int u^n du = \frac{u^{n+1}}{n+1}$$

$$= \frac{u^3}{3} - 2\frac{u^5}{5} + \frac{u^7}{7} + C \qquad u = \cos(x)$$

$$= \frac{\cos^3(x)}{3} - \frac{2\cos^5(x)}{5} + \frac{\cos^7(x)}{7} + C$$