

# ROMANIAN MATHEMATICAL MAGAZINE

**Find:**

$$\Omega = \int_0^{\infty} \frac{\sqrt{x}}{x^6 + 1} dx$$

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*Solution by Daniel Sitaru – Romania*

We will use the formula:

$$\int_0^{\infty} \frac{x^m}{1+x^n} dx = \frac{\pi}{n \sin\left(\frac{m+1}{n}\pi\right)}; 0 < m+1 < n$$

$$\begin{aligned}\Omega &= \int_0^{\infty} \frac{\sqrt{x}}{x^6+1} dx = \int_0^{\infty} \frac{x^{\frac{1}{2}}}{1+x^6} dx = \\ &= \frac{\pi}{6 \sin\left(\frac{\frac{1}{2}+1}{6}\pi\right)} = \frac{\pi}{6 \sin\left(\frac{3\pi}{12}\right)} = \frac{\pi}{6 \sin\frac{\pi}{4}} = \frac{\pi}{6 \cdot \frac{\sqrt{2}}{2}} = \frac{\pi}{3\sqrt{2}} = \frac{\pi\sqrt{2}}{6}\end{aligned}$$