Answer on Question #80050 – Math – Calculus

Question

⌡1÷x^3*(x^3+1)^1/3

Solution

$$I = \int \frac{dx}{x^3(x^3+1)^{\frac{1}{3}}} = \int \frac{dx}{x^4\left(1+\frac{1}{x^3}\right)^{\frac{1}{3}}}$$

$$u = \left(1+\frac{1}{x^3}\right)^{\frac{1}{3}} \rightarrow du = -\frac{dx}{x^4\left(1+\frac{1}{x^3}\right)^{\frac{2}{3}}},\ udu = -\frac{dx}{x^4\left(1+\frac{1}{x^3}\right)^{\frac{1}{3}}}.$$

Thus, $I = -\int udu = -\frac{u^2}{2} + C = -\frac{1}{2}\left(1+\frac{1}{x^3}\right)^{\frac{2}{3}} + C = -\frac{(x^3+1)^{\frac{2}{3}}}{2x^2} + C.$