

Answer on Question #79976 – Math – Calculus

Question

$$I = \int \frac{x^8}{1+x^{18}} dx$$

Solution

We can do a substitution:

$$x^9 = t$$

Then

$$x = \sqrt[9]{t};$$

$$dx = \frac{t^{-\frac{8}{9}}}{9} dt \Rightarrow x^8 dx = \frac{1}{9} dt.$$

So

$$I = \int \frac{\frac{1}{9}}{1+(\sqrt[9]{t})^{18}} dt = \frac{1}{9} \cdot \int \frac{1}{1+t^2} dt = \frac{1}{9} \cdot (\arctan(t) + const)$$

And finally put $t = x^9$ back again:

$$I = \frac{1}{9} \cdot (\arctan(x^9) + const).$$

$$\text{Answer: } \int \frac{x^8}{1+x^{18}} dx = \frac{1}{9} \cdot (\arctan(x^9) + const).$$