Answer on Question #84251 – Math – Calculus

Question

Intregation of (x^2/(x^4-1))dx
So in solution
2nd line (x^2/((x^2-1) (x^2+1)))dx
3rd line ((1/2)÷(x^2-1)+(1/2)÷(x^2+1))dx

The 3rd line please explain and what is the formula?

Solution

It's decomposition of a rational fraction to the sum of the simplest:

$$(x^2/((x^2-1)\,(x^2+1))) = A/(x^2-1) + B/(x^2+1)$$

Multiplying both sides by (x^2-1) (x^2+1) one gets

$$x^2 = A*(x^2+1) + B*(x^2-1)$$

If x = 0 : 0 = A – B

$$A = B \quad (1)$$

If x = 1: 1 = 2*A

$$A = ½ \quad (2)$$

It follows from (1) and (2) that B = ½. Thus, A = ½ and B = ½.

So, we have the 3rd line.