Exemplar Problem

Trigonometric Functions

11. If
$$tan(A + B) = p$$
, $tan(A - B) = q$, then show that $tan 2A = (p + q) / (1 - pq)$. [Hint: Use $2A = (A + B) + (A - B)$]

Solution:

We know that,

$$tan 2A = tan (A + B + A - B)$$

Hence, $\tan 2A = 1 - pq$

And also,

$$tan(x + y) = \frac{tan x + tan y}{1 - tan x tan y}$$

$$tan(A+B) + tan(A-B)$$

$$\therefore tan 2A = 1 - tan(A+B) tan(A-B)$$
Substituting the values given in question,
$$\frac{p+q}{1 - pq}$$

$$\Rightarrow tan 2A = 1 - pq$$