Cambridge International AS & A Level

Mathematics 9709/32

Paper 3 Pure Mathematics 3 **May/June 2025**

Question No (4)

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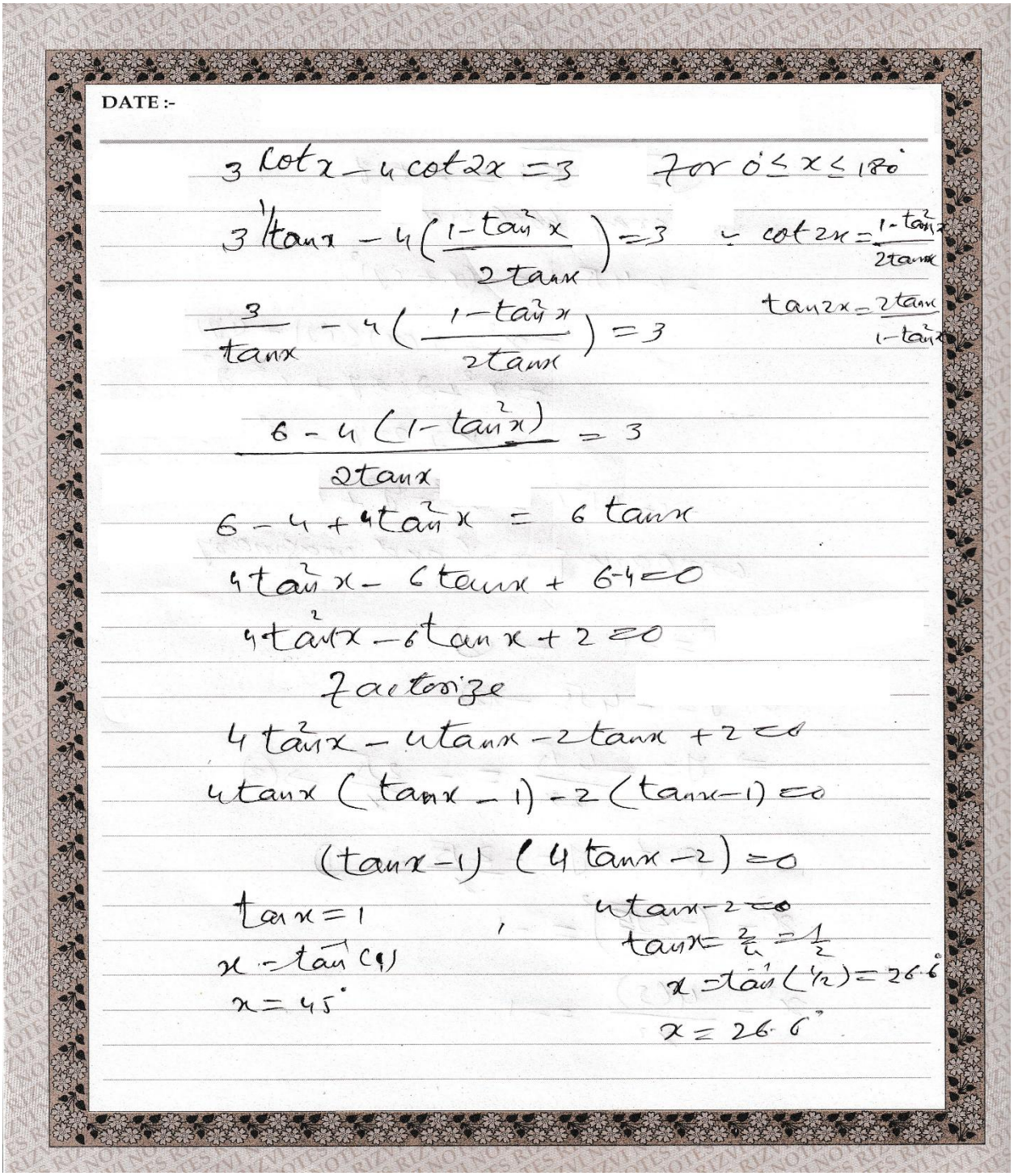
Question No (4)

Solve the equation $3\ \cot x - 4\ \cot 2x = 3\ for\ 0° \leq x \leq 180°$.

Solution:



DATE :-

$3\cot x - 4\cot 2x = 3 \quad for\ 0° \leq x \leq 180°$

$3\frac{1}{\tan x} - 4\left(\frac{1-\tan^2 x}{2\tan x}\right) = 3 \quad \because \cot 2x = \frac{1-\tan^2 x}{2\tan x}$

$\frac{3}{\tan x} - 4\left(\frac{1-\tan^2 x}{2\tan x}\right) = 3 \quad \tan 2x = \frac{2\tan x}{1-\tan^2 x}$

$\frac{6 - 4(1-\tan^2 x)}{2\tan x} = 3$

$6 - 4 + 4\tan^2 x = 6\tan x$

$4\tan^2 x - 6\tan x + 6 - 4 = 0$

$4\tan^2 x - 6\tan x + 2 = 0$

Factorize

$4\tan^2 x - 4\tan x - 2\tan x + 2 = 0$

$4\tan x(\tan x - 1) - 2(\tan x - 1) = 0$

$(\tan x - 1)(4\tan x - 2) = 0$

$\tan x = 1$

$x = \tan^{-1}(1)$

$x = 45°$

$4\tan x - 2 = 0$

$\tan x = \frac{2}{4} = \frac{1}{2}$

$x = \tan^{-1}(1/2) = 26.6°$

$x = 26.6°$