Assuming the derivative of 
$$\tan x$$
, prove that 
$$\frac{dy}{dx} = \frac{1}{1+x^2}$$

5. (a)

 $v = \tan^{-1} x$ 

(3)

**(5)** 

**(2)** 

$$f(x) = x \tan^{-1} 4x$$
 (b) Show that

 $\int f(x)dx = Ax^2 \tan^{-1} 4x + Bx + C \tan^{-1} 4x + k$ 

where k is an arbitrary constant and A, B and C are constants to be determined.

(a) Here find in such form the man value of 
$$f(x)$$
 and the interval  $\begin{bmatrix} 0 & \sqrt{3} \end{bmatrix}$ 

(c) Hence find, in exact form, the mean value of f(x) over the interval  $\left[0, \frac{\sqrt{3}}{4}\right]$