

TRIGONOMETRY (Q 4 & 5, PAPER 2)

LESSON NO. 10: INVERSE TRIG

2006

5 (a) (i) Copy and complete the table below for $f: x \rightarrow \tan^{-1} x$, giving the values for $f(x)$ in terms of π .

x	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
$f(x)$						$\frac{\pi}{4}$	

(ii) Draw a graph of $y = f(x)$ in the domain $-2 \leq x \leq 2$, scaling the y-axis in terms of π .

(iii) Draw the two horizontal asymptotes of the graph.

(iv) For some values of $k \in \mathbf{R}$, but not all values, $\tan^{-1}(\tan k) = k$. State the range of values of k for which $\tan^{-1}(\tan k) = k$. Show, by means of an example, what happens outside the range.

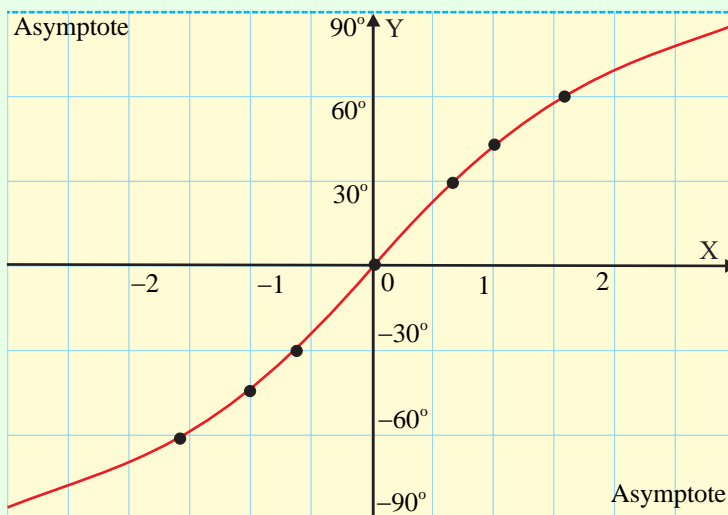
SOLUTION

5 (a) (i)

x	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
$f(x)$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$

5 (a) (ii)

5 (a) (iii)



5 (a) (iv)

You can see from the graph the range of values which apply to $\tan^{-1} x$: $-\frac{\pi}{2} \leq k \leq \frac{\pi}{2}$.

Choose a value outside this range like 120° .

Ex. $\tan^{-1}(\tan 120^\circ) = -60^\circ$ [Use your calculator to show this.]

You can see when you go outside the range from -90° to 90° , that $\tan^{-1}(\tan k) = k$ does not apply.