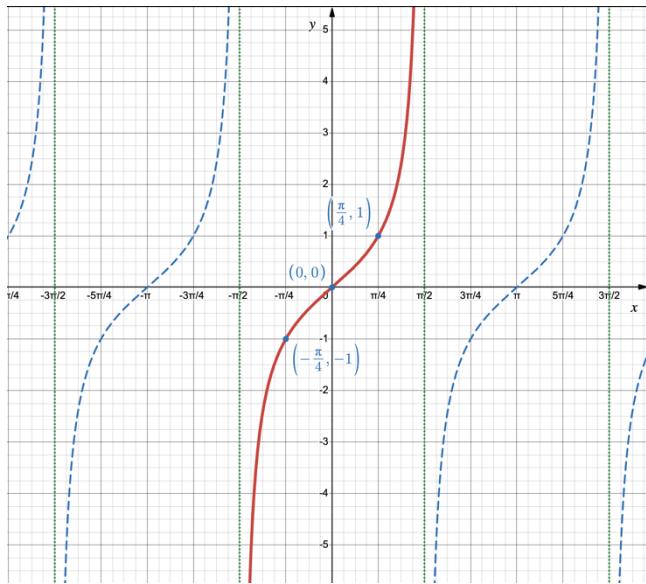


MAT1375, Classwork21, Fall2025

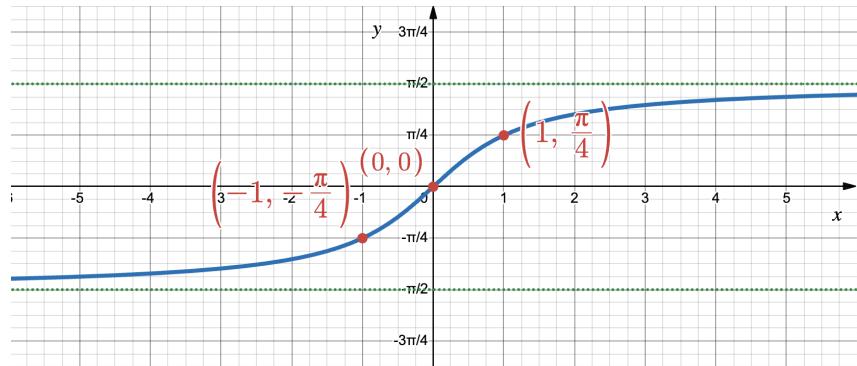
Ch19. Inverse Trigonometric Functions II

1. The graph of $y = \tan^{-1}(x)$:

$$y = \tan(x) \text{ (the restricted tangent)}$$



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



$$y = \tan(x) \text{ (the restricted tangent)}$$

Angle: $(-\frac{\pi}{2}, \frac{\pi}{2})$

Value: $(-\infty, \infty)$

$$\text{V.A.: } x = -\frac{\pi}{2}, x = \frac{\pi}{2}$$

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

Value:

$$\text{Domain: } (-\infty, \infty)$$

angle: $(-\frac{\pi}{2}, \frac{\pi}{2})$

$$\text{Range: } y = -\frac{\pi}{2} \dots y = \frac{\pi}{2}$$

2. How to find the value of $\tan^{-1}(x)$:

Let $\theta = \tan^{-1}(x)$. It implies $x = \tan(\theta)$ where $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$. Then find the θ from the following table:

θ (or $\tan^{-1}(x)$)	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\tan(\theta)$ (or x)	undef.	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undef.

3. Find the value of the given inverse tangent functions.

a) $\tan^{-1}(\sqrt{3})$ d) $\tan^{-1}(-1)$

$$\frac{\pi}{3}$$

$$-\frac{\pi}{4}$$

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4. Composition of Functions Involving with Inverse Trigonometry Functions.

a) $\sin^{-1} \left(\sin \left(\frac{\pi}{4} \right) \right)$ b) $\sin^{-1} \left(\sin \left(\frac{5\pi}{4} \right) \right)$ c) $\cos(\cos^{-1}(0.6))$ d) $\cos(\cos^{-1}(1.5))$

e) $\sin^{-1} \left(\sin \left(\frac{3\pi}{2} \right) \right)$ f) $\sin^{-1}(\sin(\pi))$ g) $\cos \left(\tan^{-1} \left(\frac{5}{12} \right) \right)$

Sol a) $\sin^{-1} \left(\frac{\sqrt{2}}{2} \right) = \frac{\pi}{4}$

b) $\sin^{-1} \left(-\frac{\sqrt{2}}{2} \right) = -\frac{\pi}{4}$