$$\int u^n\,du = \frac{u^{n+1}}{n+1} + C \qquad (n \neq -1)$$

$$\int \frac{du}{u} = \ln|u| + C$$

$$\int e^u\,du = e^u + C$$

4.5 #19 $\displaystyle\int 5x\sqrt[3]{1-x^2}\,dx$

$$\boxed{\begin{aligned} u &= 1-x^2 \\ du &= -2x\,dx \\ -\tfrac{1}{2}du &= x\,dx \end{aligned}}$$

$$= -\frac{5}{2}\int \sqrt[3]{u}\,du$$

$$= -\frac{5}{2}\left(\frac{3}{4}u^{4/3}\right) + C$$

$$= -\frac{15}{8}\left(1-x^2\right)^{4/3} + C$$

5.2 #9

$$\int \frac{x}{x^2-3}\,dx$$

$$\begin{aligned} u &= x^2-3 \\ du &= 2x\,dx \\ \frac{du}{2} &= x\,dx \end{aligned}$$

$$= \frac{1}{2}\int \frac{du}{u}$$

$$= \frac{1}{2}\ln|u| + C$$

$$= \frac{1}{2}\ln|x^2-3| + C$$

5.4 #97 $\displaystyle\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$

$$\boxed{\begin{aligned} u &= \sqrt{x} \\ du &= \tfrac{1}{2}x^{-1/2}\,dx \\ 2\,du &= x^{-1/2}\,dx \\ 2\,du &= \frac{dx}{\sqrt{x}} \end{aligned}}$$

$$= 2\int e^u\,du$$

$$= 2e^u + C$$

$$= 2e^{\sqrt{x}} + C$$

5.7 Derivatives of Inverse Trig Functions

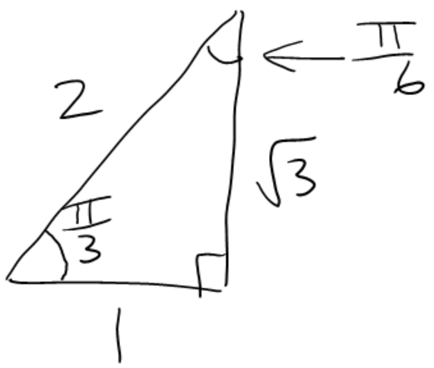
$$\sin(\text{angle}) = \#$$

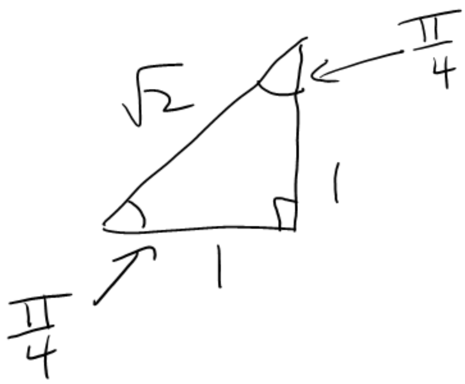
$$\arcsin(\#) = \text{angle}$$

$$\arcsin x = \sin^{-1} x$$

Not to be confused with:

$$(\sin x)^{-1} = \frac{1}{\sin x} = \csc x$$





$$\sin\frac{\pi}{6} = \frac{1}{2} \qquad \sin^{-1}\frac{1}{2} = \frac{\pi}{6}$$

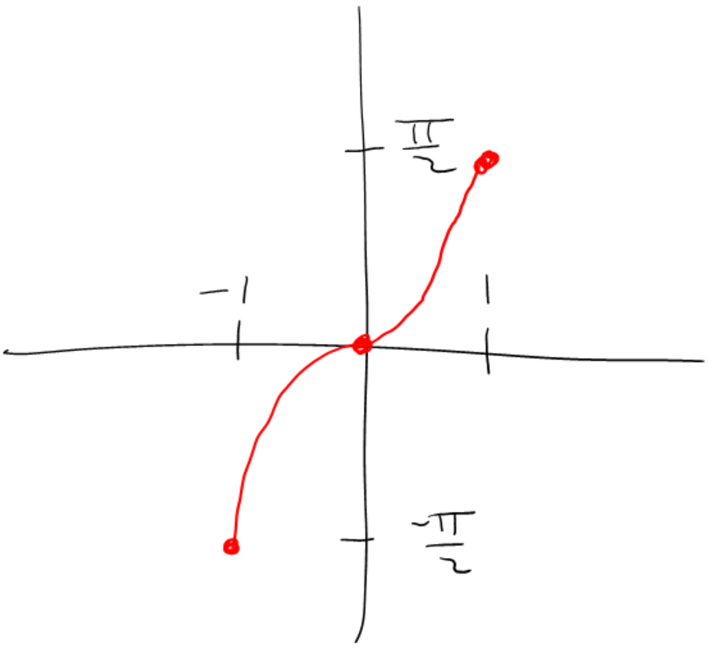
$$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2} \qquad \arcsin\frac{\sqrt{3}}{2} = \frac{\pi}{3}$$

$$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}} \qquad \arcsin\frac{1}{\sqrt{2}} = \frac{\pi}{4}$$

$$\csc\frac{\pi}{3} = \frac{2}{\sqrt{3}}$$

$$\sin^{-1}(-a) = -\sin^{-1} a$$

$$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) = -\frac{\pi}{3}$$



$y = \sin^{-1} x$

$$-1 \le x \le 1$$

$$-\frac{\pi}{2} \le y \le \frac{\pi}{2}$$

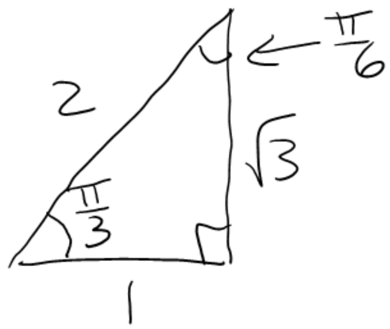
$$\tan(\text{angle}) = \#$$

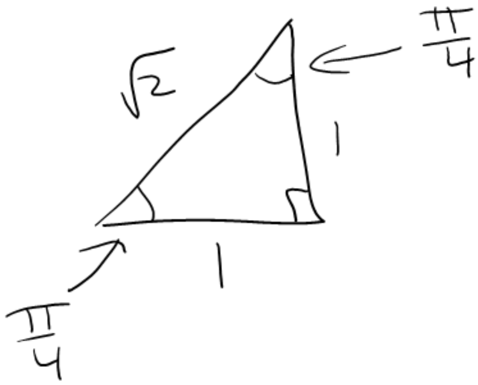
$$\arctan(\#) = \text{angle}$$

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

Not to be confused with:

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





$$\tan\frac{\pi}{3} = \sqrt{3} \qquad \arctan\sqrt{3} = \frac{\pi}{3}$$

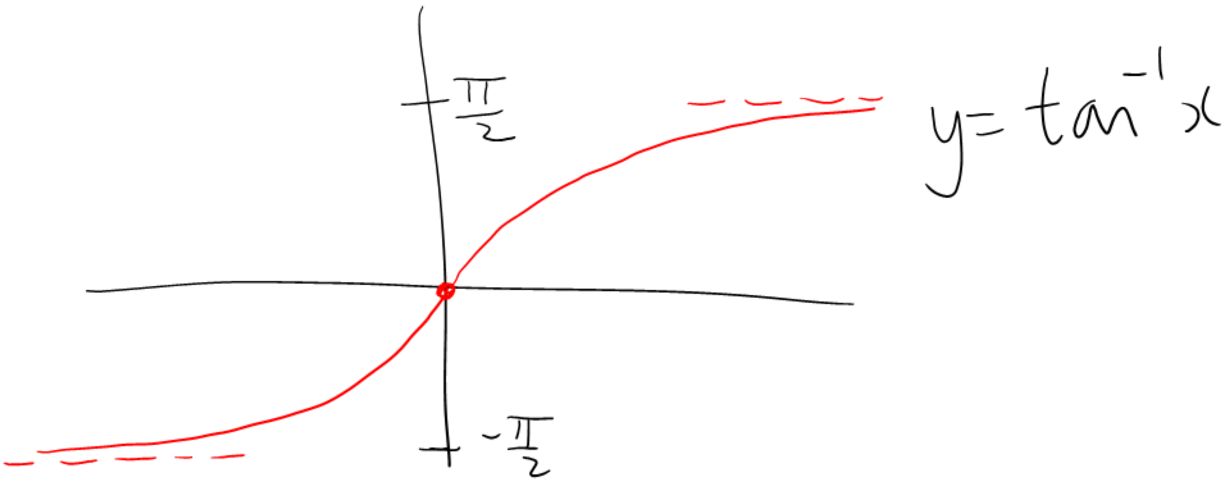
$$\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}} \qquad \tan^{-1} 1 = \frac{\pi}{4}$$

$$\tan\frac{\pi}{4} = 1 \qquad \tan^{-1}\frac{1}{\sqrt{3}} = \frac{\pi}{6}$$

$$\cot\frac{\pi}{3} = \frac{1}{\sqrt{3}}$$

$$\arctan(-a) = -\arctan a$$

$$\arctan(-1) = -\frac{\pi}{4}$$



$$-\infty < x < \infty$$

$$-\frac{\pi}{2} < y < \frac{\pi}{2}$$

<u>Ex</u>: Solve for x

$$\arctan(2x-1) = \frac{\pi}{3}$$

$$\tan(\arctan(2x-1)) = \tan\frac{\pi}{3}$$

$$2x-1 = \sqrt{3}$$

$$2x = \sqrt{3}+1$$

$$x = \frac{\sqrt{3}+1}{2}$$

$$37^\circ = 37^\circ \times \frac{\pi}{180^\circ} = \frac{37\pi}{180} \approx 0.65$$

$$\frac{d}{dx} \sin^{-1} u = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$$

$$\frac{d}{dx} \tan^{-1} u = \frac{1}{1+u^2} \frac{du}{dx}$$

<u>Ex</u>: Find y'

a) $y = \sin^{-1} 5x$

$$y' = \frac{1}{\sqrt{1-(5x)^2}} (5)$$

$$= \frac{5}{\sqrt{1-25x^2}}$$

b) $y = \tan^{-1} 4x^5$

$$y' = \frac{1}{1+(4x^5)^2} (20x^4)$$

$$= \frac{20x^4}{1+16x^{10}}$$