

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

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

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

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

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

$$= -\frac{5}{2} \int u^{1/3} du$$

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

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

S.2 #9

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

$$u = x^2 - 3$$
$$du = 2x dx$$
$$\frac{du}{2} = x dx$$

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

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

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

S.4 #97

$$\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$$

$$u = \sqrt{x}$$
$$du = \frac{1}{2} x^{-1/2} dx$$
$$2du = \frac{dx}{\sqrt{x}}$$

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

$$= 2e^u + C$$

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

S.7 Derivatives of Inverse Trig Functions

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

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

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

Not to be confused with :

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



$$\sin \frac{\pi}{6} = \frac{1}{2}$$

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

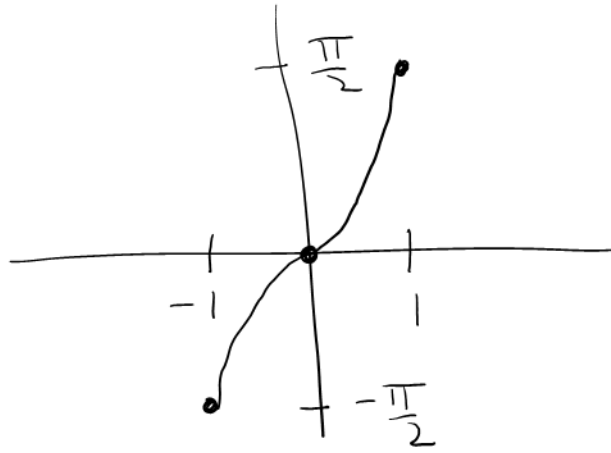
$$\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\arcsin \frac{1}{2} = \frac{\pi}{6} \quad \sin^{-1} \frac{1}{\sqrt{2}} = \frac{\pi}{4}$$

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

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

$$\arcsin\left(-\frac{\sqrt{3}}{2}\right) = -\frac{\pi}{3}$$



$$y = \arcsin x$$

$$-1 \leq x \leq 1$$

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

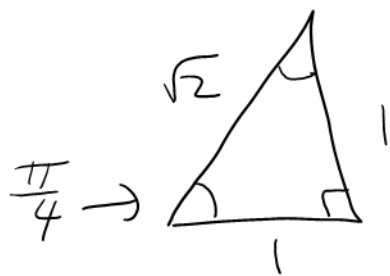
$$\tan(\text{angle}) = \#$$

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

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

Not to be confused with:

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



$$\tan \frac{\pi}{6} = \frac{1}{\sqrt{3}}$$

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

$$\tan \frac{\pi}{4} = 1$$

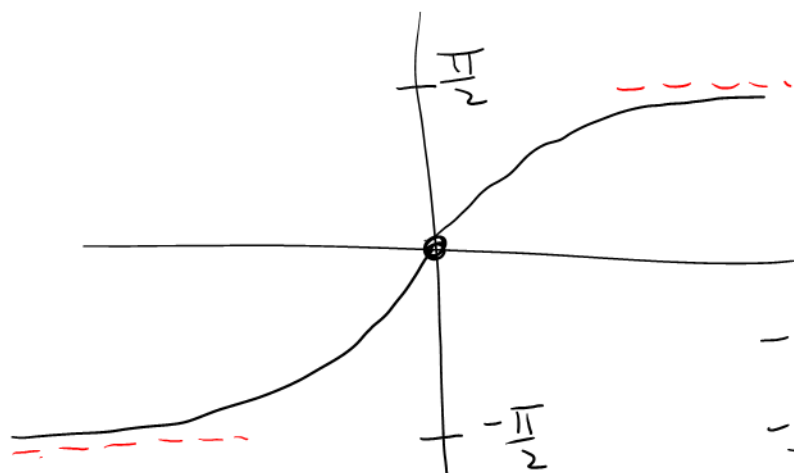
$$\tan^{-1} \frac{1}{\sqrt{3}} = \frac{\pi}{6}$$

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

$$\tan^{-1} 1 = \frac{\pi}{4}$$

$$\boxed{\arctan(-a) = -\arctan a}$$

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



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

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

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

Ex: Solve for x

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

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

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

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

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

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

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

Ex: Find y'

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

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

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

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

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

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