§6.6 #65

$$\int \frac{dx}{\sqrt{1-x^2}\,\sin^{-1}x} = \int \frac{1}{u}\,du$$

$$= \ln|u| + C$$

$$= \ln|\sin^{-1}(x)| + C$$

$$\frac{d}{dx}\left[\sin^{-1}(x)\right] = \frac{d}{dx}\left[\arcsin(x)\right]$$

$$= \frac{1}{\sqrt{1-x^2}}$$ is the key observation.

$u = \arcsin(x)$

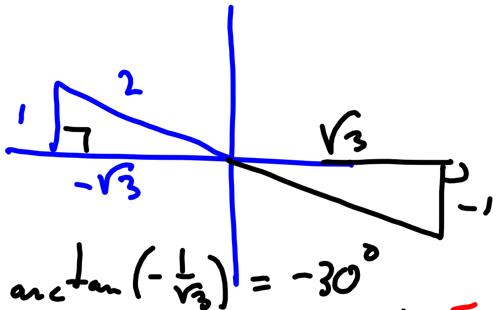
$du = \frac{1}{\sqrt{1-x^2}}\,dx$

§6.6 #4

$\cot\theta = -\sqrt{3}$

$\cot^{-1}(-\sqrt{3}) = \text{arccot}(-\sqrt{3})$

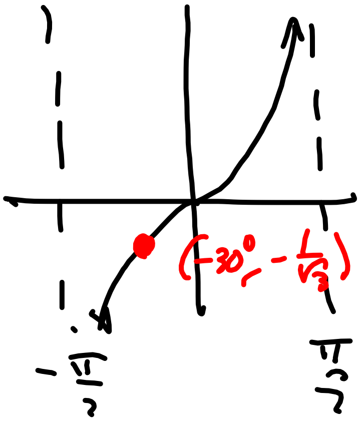
$" = \qquad \tan\theta = -\frac{1}{\sqrt{3}}$

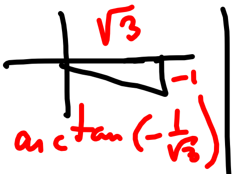


$R(\cot^{-1}(x)) = (0, \pi)$

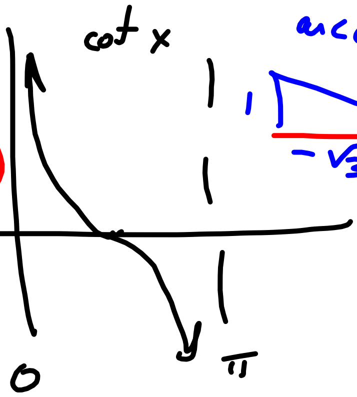
$R(\tan^{-1}(x)) = (-\frac{\pi}{2}, \frac{\pi}{2})$

$\arctan(-\frac{1}{\sqrt{3}}) = -30^\circ$





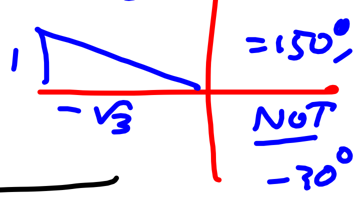
cot x

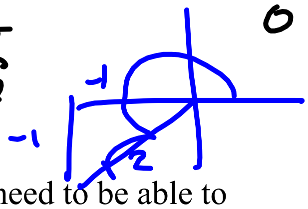


$\text{arccot}(-\sqrt{3}) = \frac{5\pi}{6}$

$= 150^\circ$

NOT -30°





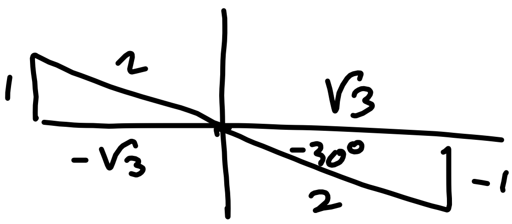
$\sin^{-1}(\sin(\frac{5\pi}{4})) = \sin^{-1}(-\frac{1}{2})$

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

You really need to be able to

$\cos^{-1}(\cos(\theta))$ isn't always θ

$\cos(\cos^{-1}(\theta))$ is always the original ratio.



6.8 #4

$$\lim_{x\to\infty}\left(x\sin\left(\frac{\pi}{x}\right)\right) = \infty\cdot 0$$

$\frac{0}{0}$ switch: $x\sin\left(\frac{\pi}{x}\right) = \dfrac{\sin\left(\frac{\pi}{x}\right)}{\frac{1}{x}} \xrightarrow[L'H]{x\to\infty} \dfrac{-\frac{\pi}{x^2}\cos\left(\frac{\pi}{x}\right)}{-\frac{1}{x^2}}$

$\xrightarrow{x\to\infty} \pi\cos\left(\frac{\pi}{x}\right) \xrightarrow{x\to\infty} \pi$

6.6

28 $y = \arcsin\left(\sqrt{\sin\theta}\right) \longrightarrow$

$y' =$