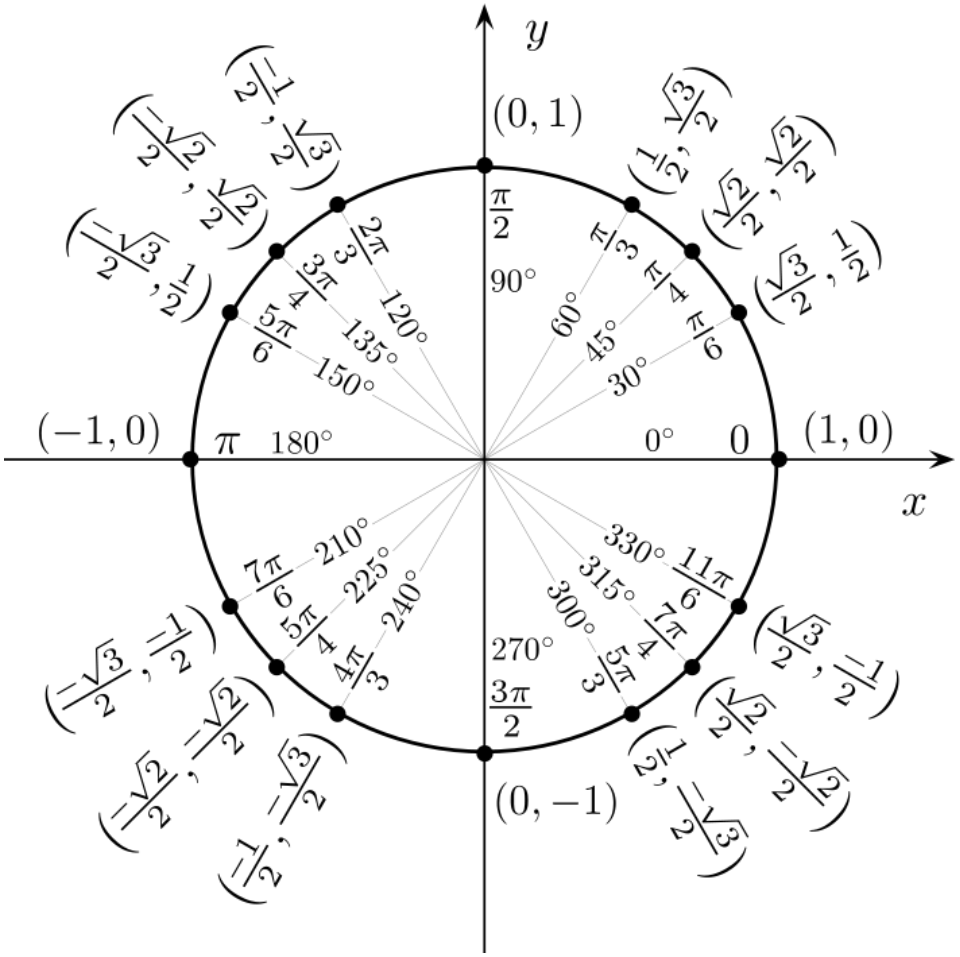
Sec 3.5 Inverse Trigonometric Functions

A. Unit Circle and Common Values



Degrees	Radians	sin θ	cos θ	tan θ	cot θ	sec θ	csc θ
0°	0	0	1	0	Undefined	1	Undefined
30°	π/6	1/2	√3/2	√3/3	√3	2√3/3	2
45°	π/4	√2/2	√2/2	1	1	√2	√2
60°	π/3	√3/2	1/2	√3	√3/3	2	2√3/3
90°	π/2	1	0	Undefined	0	Undefined	1
120°	2π/3	√3/2	-1/2	-√3	-√3/3	-2	2√3/3
135°	3π/4	√2/2	-√2/2	-1	-1	-√2	√2
150°	5π/6	1/2	-√3/2	-√3/3	-√3	-2√3/3	2
180°	π	0	-1	0	Undefined	-1	Undefined
210°	7π/6	-1/2	-√3/2	√3/3	√3	-2√3/3	-2
225°	5π/4	-√2/2	-√2/2	1	1	-√2	-√2
240°	4π/3	-√3/2	-1/2	√3	√3/3	-2	-2√3/3
270°	3π/2	-1	0	Undefined	0	Undefined	-1
300°	5π/3	-√3/2	1/2	-√3	-√3	2	-2√3/3
315°	7π/4	-√2/2	√2/2	-1	-1	√2	-√2
330°	11π/6	-1/2	√3/2	-√3/3	-√3	2√3/3	-2
360°	2π	0	1	0	Undefined	1	Undefined

B. Derivatives of Inverse Trigonometric Functions (You must know these!)

1.) $\frac{d}{dx}\left(\sin^{-1} x\right) = \frac{1}{\sqrt{1-x^2}}$	4.) $\frac{d}{dx}\left(\csc^{-1} x\right) = -\frac{1}{x\sqrt{x^2-1}}$
2.) $\frac{d}{dx}\left(\cos^{-1} x\right) = -\frac{1}{\sqrt{1-x^2}}$	5.) $\frac{d}{dx}\left(\sec^{-1} x\right) = \frac{1}{x\sqrt{x^2-1}}$
3.) $\frac{d}{dx}\left(\tan^{-1} x\right) = \frac{1}{1+x^2}$	6.) $\frac{d}{dx}\left(\cot^{-1} x\right) = -\frac{1}{1+x^2}$

Examples

1.) Find the exact value of each expression. Your answer should be either a fraction or an integer.

$\cos^{-1}(1) = \square\,\pi$

$\sin^{-1}(\sqrt{2}/2) = \square\,\pi$

$\sin^{-1}(1/2) = \square\,\pi$

$\arctan(\tan(7\pi/6)) =$

$\sin(\arcsin(0.9)) =$

2.) Let $f(x) = \left(\tan^{-1} x\right)^7$. Find $f'(x)$.

3.) Let $f(x) = \cos^{-1}\left(e^{8x}\right)$. Find $f'(x)$.

4.) Find the limit: $\lim_{x\to 1^-} \sin^{-1} x =$

5.) Find the limit: $\lim_{x\to\infty} \arctan(-e^x) =$