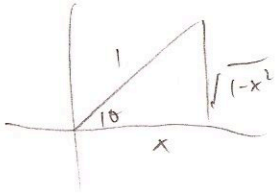
NAME:_____

HOMEWORK FOR WORKSHEET 7 MATH 1300 DUE February 29, 2008

1. Use the method developed in Worksheet 7 to find the derivative of $\cos^{-1}(x)$.

$$\cos(\cos^{-1}x) = x$$

$$\frac{d}{dx}\cos(\cos^{-1}x) = -\sin(\cos^{-1}x)\cdot\frac{d}{dx}\cos^{-1}x = 1$$

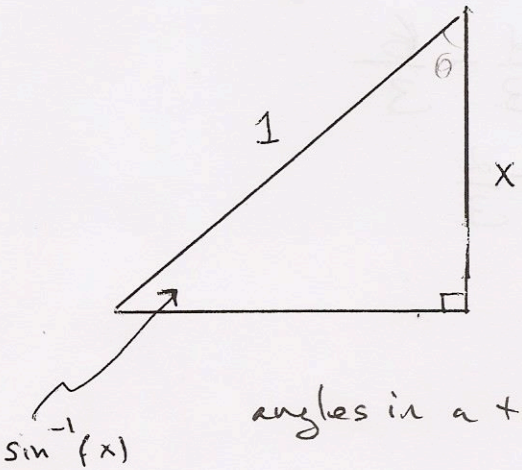


$$\sin(\cos^{-1}x) = \sin\theta = \sqrt{1-x^2}, \quad \theta \in [0, \pi]$$

$$\Rightarrow \frac{d}{dx}\cos^{-1}x = -\frac{1}{\sqrt{1-x^2}}$$

2. An alternate method for finding the derivative of $\cos^{-1}(x)$ is to find an identity relating this function and $\sin^{-1}(x)$ and then differentiating this identity (and using that we already know $\frac{d}{dx}\sin^{-1}(x)$. Assuming $0 < x < 1$ use the basic triangle from Worksheet 7 to show that

$$\sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2}.$$



$\theta = \cos^{-1} x$

$\therefore \sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2}$

angles in a triangle add up to $180° = \pi$

3. Differentiate the relationship you found in (2) to find $\cos^{-1}(x)$.

$$\frac{d}{dx}\sin^{-1}(x) + \frac{d}{dx}\cos^{-1}(x) = 0$$

$$\Rightarrow \frac{d}{dx}\cos^{-1}(x) = -\frac{d}{dx}\sin^{-1}(x) = -\frac{1}{\sqrt{1-x^2}}$$