

Name _____ Banner _____

Fall 2007 **Quiz #9 Solutions** Precalculus

#1) Evaluate $\sin(\tan^{-1}(-\sqrt{3}/2))$

Define $\theta := \tan^{-1}(-\sqrt{3}/2) \in (-\pi/2, \pi/2)$, then $\tan \theta = -\sqrt{3}/2$.

Let $y = -\sqrt{3}/2$ and $x = 1$ so that $\tan \theta = y/x = -\sqrt{3}/2$ and

$$r = \pm \sqrt{x^2 + y^2} = \pm \sqrt{1 + 3/4} = \pm \sqrt{7/4} = \pm \sqrt{7}/2$$

Therefore,

$$\sin(\tan^{-1}(-\sqrt{3}/2)) = \sin \theta = y/r = \frac{-\sqrt{3}/2}{\pm \sqrt{7}/2} = \pm \sqrt{3/7}$$

But, $\theta := \tan^{-1}(-\sqrt{3}/2) \Rightarrow \theta \in (-\pi/2, \pi/2)$



and $\tan \theta = -\sqrt{3}/2 < 0 \Rightarrow \theta$ is in quadrant 2 or 4



Both of these statements are only true if $\theta \in (-\pi/2, 0]$
and $\sin \theta \leq 0$ for $\theta \in (-\pi/2, 0]$.

Thus, $\sin \theta = \boxed{\sin(\tan^{-1}(-\sqrt{3}/2)) = -\sqrt{3/7}}$

#2) Evaluate $\tan(\arcsin(-\sqrt{3}/2))$

$$\tan(\arcsin(-\sqrt{3}/2)) = \tan(-\pi/3) = \frac{-\sqrt{3}/2}{1/2} = -\sqrt{3} = \tan(\arcsin(-\sqrt{3}/2))$$