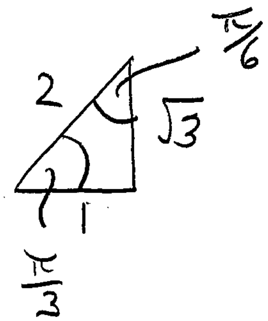
Math 122 F09N01 - Quiz 1
Sep 18 2009

Name: SOLUTIONS
Stu#:

(1) [**3 points**] Determine $\tan^{-1}\left(\sqrt{3}\right)$.

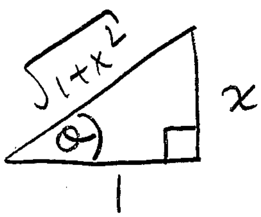
$$\tan^{-1}(\sqrt{3}) = \text{angle } -\frac{\pi}{2} < \theta < \frac{\pi}{2} \text{ such that } \tan(\theta) = \sqrt{3}$$

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



(2) [**5 points**] Simplify $\sin\left(\tan^{-1}x\right)$. Your final answer should not contain any trigonometric (or inverse trigonometric) functions.

Let $\theta = \tan^{-1}(x)$, so $\tan\theta = \frac{x}{1}$



$$\therefore \sin\left(\tan^{-1}x\right) = \sin\theta = \frac{x}{\sqrt{1+x^2}}.$$

(3) [**3 points**] Compute the derivative of $y = \cos^{-1}\left(e^{2x}\right)$.

$$\frac{dy}{dx} = \frac{-1}{\sqrt{1-(e^{2x})^2}} \cdot \frac{d}{dx}\left(e^{2x}\right)$$

$$= \frac{-1}{\sqrt{1-e^{4x}}} \cdot 2e^{2x}$$

(4) [**4 points**] Determine $\lim_{x\to\infty} \arctan(e^x)$.

As $x \to \infty$, $e^x \to \infty$, and so $\arctan(e^x) \to \frac{\pi}{2}$

$$\therefore \lim_{x\to\infty} \arctan(e^x) = \frac{\pi}{2}.$$