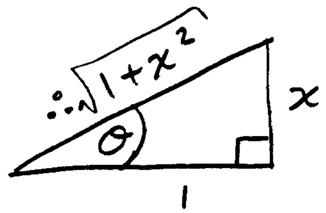
Math 122 Sec S08N04 - Quiz 1 **Name:**
Jan 14 2008 **Stu#:** SOLUTIONS.

(1)[5 points] Simplify

$$\sin\left(\tan^{-1}(x)\right)$$

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

$\therefore \tan(\theta) = \frac{x}{1}$



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

(2)[5 points] Find the derivative of

$$H(x) = (1+x^2)\arctan(x)$$

$$H'(x) = (2x)\arctan(x) + \cancel{(1+x^2)}\frac{1}{\cancel{(1+x^2)}}$$

$$= 2x\arctan(x) + 1$$

(3)[5 points] Find $g'(2)$ where

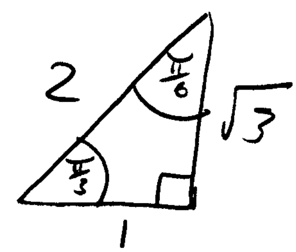
$$g(x) = x\sin^{-1}(x/4) + \sqrt{16 - x^2}$$

$$g'(x) = \sin^{-1}\left(\frac{x}{4}\right) + x\,\frac{1}{\sqrt{1-\left(\frac{x}{4}\right)^2}} \cdot \frac{1}{4} + \frac{1}{\cancel{2}}\left(16-x^2\right)^{-\frac{1}{2}}\left(-\cancel{2}x\right)$$

$$g'(2) = \sin^{-1}\left(\frac{2}{4}\right) + \frac{\cancel{2}}{\sqrt{1-\left(\frac{2}{4}\right)^2}} \cdot \frac{1}{\cancel{4}_{2}} - 2\left(16-2^2\right)^{-\frac{1}{2}}$$

$$= \sin^{-1}\left(\frac{1}{2}\right) + \cancel{\frac{1}{\cancel{2}}\,\frac{\cancel{2}}{\sqrt{3}}} \cancel{- \frac{2}{2\sqrt{3}}}$$

$$= \sin^{-1}\left(\frac{1}{2}\right)$$



$$= \frac{\pi}{6}$$