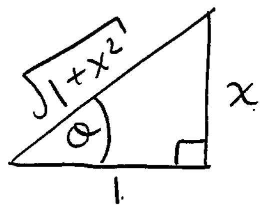
Math 122 - Quiz 1 Name: SOLUTIONS.

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

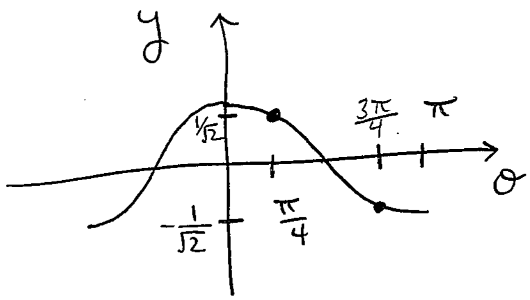
Let $\theta = \tan^{-1}(x)$, so $\tan\theta = \frac{x}{1}$



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

(2) [5] Determine the exact value of $\arccos(-1/\sqrt{2})$.

$\arccos\left(-\frac{1}{\sqrt{2}}\right) =$ angle θ in $[0,\pi]$ such that $\cos\theta = \frac{-1}{\sqrt{2}}$



$$\therefore \theta = \frac{3\pi}{4}$$

$$\therefore \arccos\left(-\frac{1}{\sqrt{2}}\right) = \boxed{\frac{3\pi}{4}}.$$

(3) [5] Differentiate

$$g(x) = \arccos(2-3x)$$

and state the domain of $g(x)$.

$$g'(x) = \frac{-1}{\sqrt{1-(2-3x)^2}} \cdot (-3)$$

$$= \frac{3}{\sqrt{1-(2-3x)^2}} .$$

<u>Domain of $g(x)$</u>: Must have

$$-1 \leq 2-3x \leq 1$$

$$\Rightarrow \quad -3 \leq -3x \leq -1$$

$$\Rightarrow \quad \frac{1}{3} \leq x \leq 1$$

$$\therefore \left[\frac{1}{3}, 1\right]$$