

Name _____

Quiz 2

1) Evaluate the integral. $\int \cot^2(x) dx$

$$\cot^2(x) = \csc^2(x) - 1$$

$$\int \cot^2(x) dx = \int \csc^2(x) - 1 dx = -\cot(x) - x + C$$

2) Evaluate the integral. $\int \frac{x \tan^{-1}(x^2)}{1+x^4} dx$

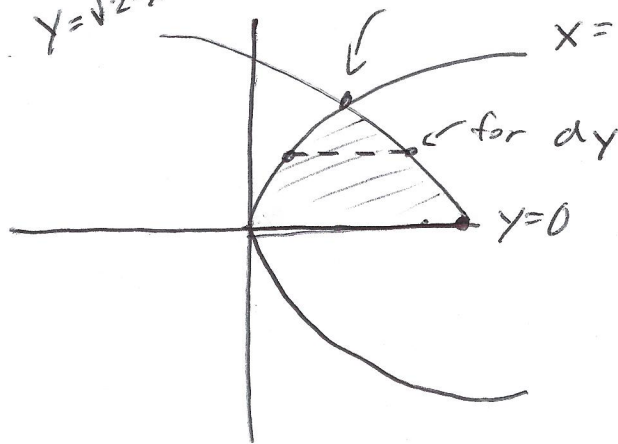
$$\text{Let } u = x^2 \\ du = 2x dx$$

$$\int \frac{x \tan^{-1}(x^2)}{1+x^4} dx = \frac{1}{2} \int \frac{\tan^{-1}(u)}{1+u^2} du \rightarrow \begin{matrix} v = \tan^{-1}(u) \\ dv = \frac{1}{1+u^2} du \end{matrix}$$

$$= \frac{1}{2} \int v dv = \frac{1}{2} \frac{v^2}{2} + C = \frac{(\tan^{-1}(x^2))^2}{4} + C$$

3) Sketch the region enclosed by the given curves and find its area.

$x = y^2, y = \sqrt{2-x}, y = 0$ need to find
 $Y = \sqrt{2-x}$



note $y > 0$

$$x = y^2 = 2 - x$$

$$\Rightarrow 2x = 2$$

$$x = 1$$

$$\text{so } 1 = x = y^2$$

$$\text{so } y = \pm 1 \quad \text{but } y \geq 0$$

$$\Rightarrow \int_0^1 \text{right} - \text{left} \, dy = \int_0^1 \cancel{\sqrt{2-x}} \, 2 - y^2 - y^2 \, dy$$

$$= \int_0^1 2 - 2y^2 = \left[2y - \frac{2y^3}{3} \right]_0^1 = 2 - \frac{2}{3}$$