QUIZ 3 MATH 230, CALCULUS II, SPRING 2017 NAME: SOLUTION

1. Differentiate $y = \cot^{-1}(\sqrt{x}) + 3^{\csc^{-1} x}$

$$y' = \frac{-1}{1+(\sqrt{x})^2} \cdot \frac{1}{2\sqrt{x}} + 3^{\csc^{-1}x} \cdot \frac{-1}{x\sqrt{x^2-1}} \cdot \ln 3$$

2. Evaluate $\int_0^{\pi/4} \frac{\sec^2 x}{\sqrt{1-(\tan x)^2}}\, dx$

(1) LET $u = \tan x$

(2) $du = \sec^2 x\, dx$

(3) BOUNDS: IF $x = \pi/4$, $u = \tan(\pi/4) = 1$

IF $x = 0$, $u = \tan(0) = 0$

(4) SUBSTITUTE

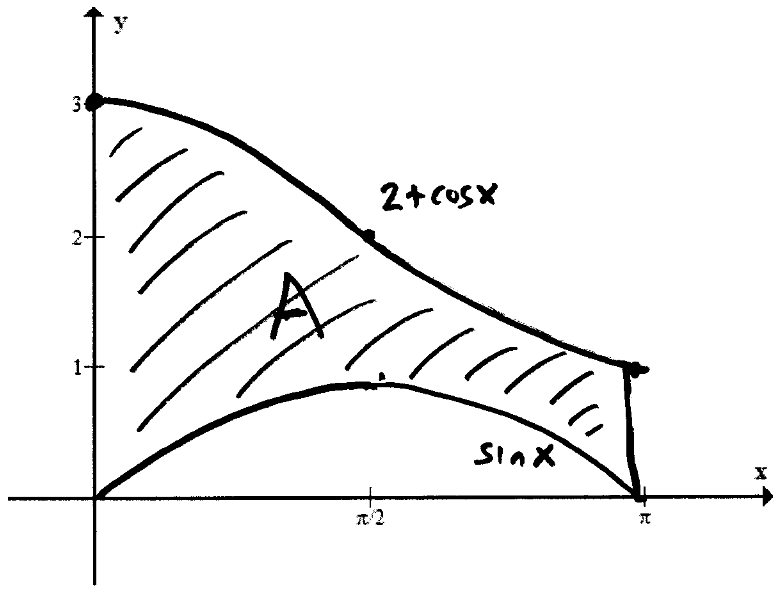
$$\int_0^1 \frac{1}{\sqrt{1-u^2}}\, du = \sin^{-1}(u)\Big|_0^1$$

$$= \sin^{-1}(1) - \sin^{-1}(0)$$

$$= \pi/2 - 0$$

$$= \pi/2$$

3. Sketch the region bounded by $y = \sin(x)$, $y = 2 + \cos(x)$, $x = 0$, $x = \pi$. Then find the area of the region.



$$A = \int_0^{\pi} (2 + \cos x) - (\sin x)\, dx$$

$$= 2x + \sin x + \cos x \Big|_0^{\pi}$$

$$= (2\pi + \sin\pi + \cos\pi) - (2\cdot 0 + \sin 0 + \cos 0)$$

$$= (2\pi - 1) - (1)$$

$$= 2\pi - 2$$