Assignment #29

4/27/2001

Extra Problems

(#1) Solve for x:

a) $y = 2\ln(3x)$

$\frac{y}{2} = \ln 3x \Rightarrow e^{y/2} = 3x \Rightarrow \boxed{x = \frac{e^{y/2}}{3}}$

b) $y = 3\sin x$

$\frac{y}{3} = \sin x \Rightarrow \boxed{x = \sin^{-1}\left(\frac{y}{3}\right)}$

c) $y = 2\arccos x$

$\frac{y}{2} = \arccos x \Rightarrow \boxed{x = \cos\left(\frac{y}{2}\right)}$

d) $y = 5\arctan(2x)$

$\frac{y}{5} = \arctan(2x) \Rightarrow 2x = \tan\left(\frac{y}{5}\right) \Rightarrow \boxed{x = \frac{\tan\left(\frac{y}{5}\right)}{2}}$

(#2) a) $y_1 = e^x \quad y_2 = \ln x \quad @\ x = 2$

$y_1(2) = e^2 \quad y_2(2) = \ln 2$

Vertical distance $= \boxed{e^2 - \ln 2}$

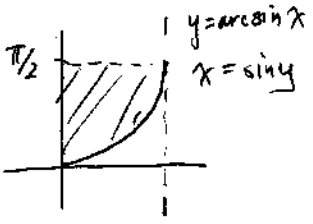
b) $y = e^x \Rightarrow x = \ln y$

$y = \ln x \Rightarrow x = e^y$

Horizontal distance $@\ y = 2 = \boxed{e^2 - \ln 2}$

27.2

(#5)



$\text{Area} = \int_0^{\pi/2} \sin y\,dy = -\cos y \Big|_0^{\pi/2}$

$= -\cos\left(\frac{\pi}{2}\right) + \cos(0) = \boxed{1}$

(#7) using vertical slices

find intersection point:

$\tan x = 1$

$x = \pi/4 \quad y = 1$

$$\text{Area} = \int_0^{\pi/4} \tan x\,dx + \int_{\pi/4}^{\pi/2} 1\,dx$$

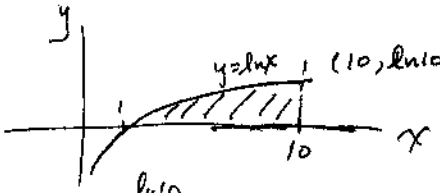
horizontal slices

$y = \tan x \implies x = \tan^{-1} y$

$$\text{Area} = \int_0^1 (1 - \tan^{-1} y)\,dy$$

(#9) only b, d, e, and f are correct

(#10)



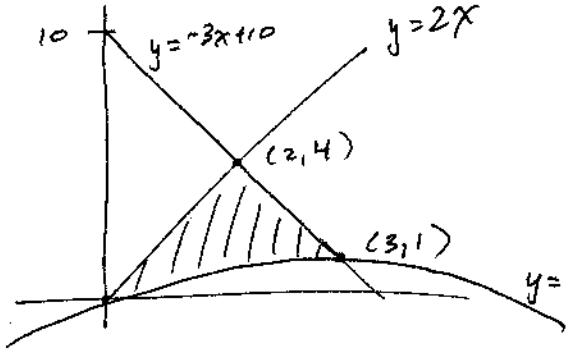
$y = \ln x$

$x = e^y$

$$\int_0^{\ln 10} 10\,dy - \int_0^{\ln 10} e^y\,dy = 10y - e^y \Big|_0^{\ln 10} = 10\ln 10 - e^{\ln 10} + e^0$$

$$= \boxed{10\ln 10 - 9}$$

(#15)



$$\text{Area} = \int_0^2 2x - \left[-\tfrac{1}{9}(x^2-6x)\right]dx + \int_2^3 (-3x+10) - \left[-\tfrac{1}{9}(x^2-6x)\right]dx$$