

8.2 Day 1 Notes

Sunday, February 26, 2017 3:15 PM

Area Area

AP Calculus AB
8.2 Day 1
Areas in the Plane

Name _____

Can you find the area between the two curves?

1. $y = \sec^2 x$ from $x = 0$ to $x = \frac{\pi}{4}$
 $y = \sin x$

Area of $\sec^2 x$ - Area of $\sin x$

$$\int_0^{\frac{\pi}{4}} \sec^2 x dx - \int_0^{\frac{\pi}{4}} \sin x dx$$

$$= \tan x \Big|_0^{\frac{\pi}{4}} - (-\cos x) \Big|_0^{\frac{\pi}{4}}$$

$$= \tan \frac{\pi}{4} - \tan 0 + \cos \frac{\pi}{4} - \cos 0$$

$$= 1 - 0 + \frac{\sqrt{2}}{2} - 1$$

$$= \frac{\sqrt{2}}{2}$$

$\int_0^{\frac{\pi}{4}} (\sec^2 x - \sin x) dx$
 $\tan x - (-\cos x) \Big|_0^{\frac{\pi}{4}}$
 $\tan \frac{\pi}{4} + \cos \frac{\pi}{4} - (\tan 0 + \cos 0)$
 $1 + \frac{\sqrt{2}}{2} - (0 + 1)$
 $= \frac{\sqrt{2}}{2}$

2. $y = 2 - x^2$ (closed region - no interval will be given) looks like $[-1, 2]$
 $y = -x$

Solve System of equations to find intersection

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

$$x^2 - x - 2 = 0$$

$$(x+1)(x-2) = 0$$

$$x = -1, 2$$

$$\int_{-1}^2 [2 - x^2 - (-x)] dx$$

$$= 2x - \frac{1}{3}x^3 + \frac{1}{2}x^2 \Big|_{-1}^2$$

$$= 2(2) - \frac{1}{3}(2)^3 + \frac{1}{2}(2)^2 - (2(-1) - \frac{1}{3}(-1)^3 + \frac{1}{2}(-1)^2)$$

$$= 4.5$$

