8.3 Day 2

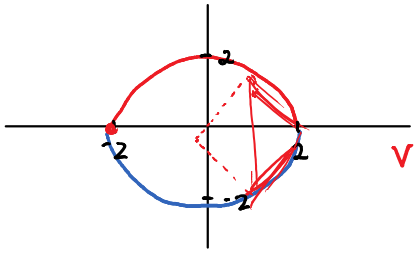
Monday, March 13, 2017 2:41 PM

AP Calculus AB
Opener 8.3 Day 2

Name_____

1. Find the formula for the area A(x) of the cross section of the solid perpendicular to the x-axis.

a. The solid lies between planes perpendicular to the x-axis at x=-2 and x=2. The cross sections perpendicular to the x-axis between these planes are squares whose diagonals run from the semicircle $y=-\sqrt{4-x^2}$ to the semicircle $y=\sqrt{4-x^2}$.



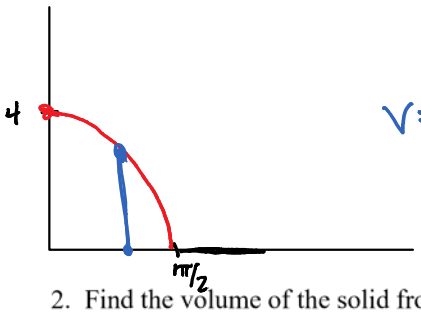
$d = 2\sqrt{4-x^2}$ $\quad A_{cs} = \frac{1}{2}\left(2\sqrt{4-x^2}\right)^2 = \frac{4}{2}(4-x^2) = 2(4-x^2)$

$V = 2\int_{-2}^{2}(4-x^2)\,dx = 2\left(4x-\frac{x^3}{3}\right)\Big|_{-2}^{2} = 2\left[\left(8-\frac{8}{3}\right)-\left(-8+\frac{8}{3}\right)\right]$

$V = 2\left[16-\frac{16}{3}\right] = \boxed{64/3}$

b. The base of a solid is the region between the curve $y=4\cos x$ and the x-axis from $x=0$ *to* $x=\frac{\pi}{2}$. The cross sections perpendicular to the x-axis are squares with bases running from the x-axis to the curve.

$s = 4\cos x$ $\quad A_{cs} = (4\cos x)^2 = 16\cos^2 x$



$V = 16\int_{0}^{\pi/2}\cos^2 x\,dx$

2. Find the volume of the solid from 1a.