Notes 6.2 Name ____________________

Volumes Using Cross Sections (6.2)

$$V=\int_a^b A(x)\,dx \qquad \text{or} \qquad V=\int_c^d A(y)\,dy$$

Finding Volumes Using Cross Sections: *Find the volume.*

1) Find the volume of the solid whose base is the region bounded by $x=2-y^2$ and $x=y^2-2$ and whose cross-sections are isosceles triangles with the base perpendicular to the y-axis and the angle between the base and the two sides of equal length is $\pi/4$.

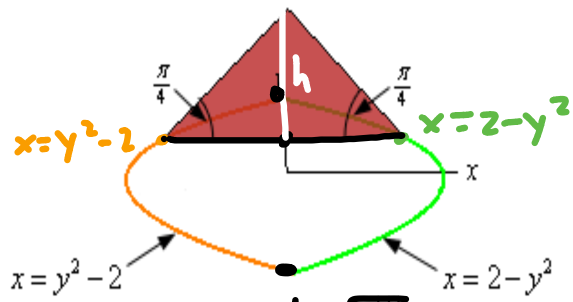
$A=\frac{1}{2}bh$

$b=(2-y^2)-(y^2-2)$

$b=2(2-y^2)=4-2y^2$

$\tan\frac{\pi}{4}=h/\frac{b}{2}=\frac{h}{2-y^2}$

$h=2-y^2$



$y=\pm\sqrt{2}$

$V=\int_{-\sqrt{2}}^{\sqrt{2}}\frac{1}{2}(4-2y^2)(2-y^2)\,dy$

$V=\int_{-\sqrt{2}}^{\sqrt{2}}(2-y^2)^2\,dy\approx\boxed{6.034}$

2) Find the volume between $f(x)=e^x$ and $g(x)=\ln|x+2|+2$, with square cross-sectional shapes that are perpendicular to the x-axis.

Using a calculator the intersections for $x=-1.841, 1.146$.

$A=x^2$

$x=\ln|x+2|+2-e^x$

$V=\int_{-1.841}^{1.146}\left(\ln|x+2|+2-e^x\right)^2dx$

$\boxed{V\approx 5.82}$