7-3 day 1 Volumes: Disc Method
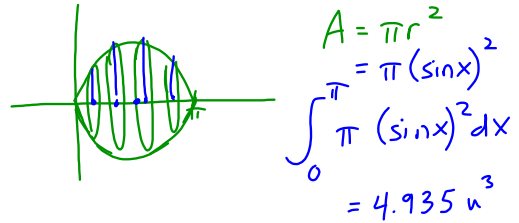
Learning Targets

I find the volume of a solid that has been rotated around an axis using the disc method.

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Discs

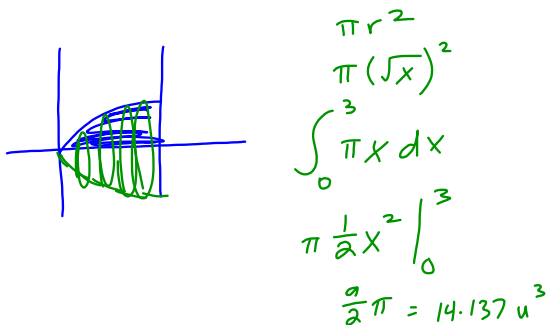Ex1. Find the volume of the solid formed by revolving the area bounded by f(x) = sin(x), the x-axis and x=π around the x-axis.

$A = \pi r^2$
$= \pi (\sin x)^2$
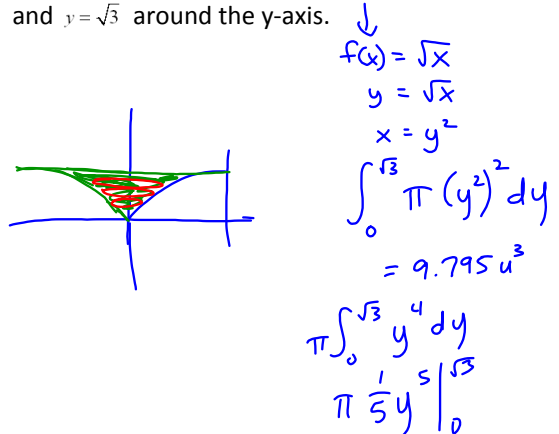$\int_0^{\pi} \pi (\sin x)^2 dx$
$= 4.935 u^3$

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Ex2. Given the funcon $f(x) = \sqrt{x}$

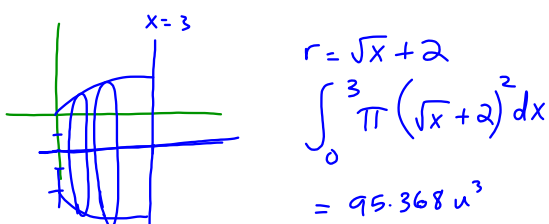a.) Find the volume of the solid formed by revolving the area bounded by f(x), the x-axis and x=3 around the x-axis.

πr^2
$\pi (\sqrt{x})^2$
$\int_0^3 \pi x \, dx$
$\pi \frac{1}{2} x^2 \Big|_0^3$
$\frac{9}{2}\pi = 14.137 u^3$

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b) Find the volume of the solid formed by revolving the area bounded by f(x), the y-axis and $y = \sqrt{3}$ around the y-axis.

$f(x) = \sqrt{x}$
$y = \sqrt{x}$
$x = y^2$
$\int_0^{\sqrt{3}} \pi (y^2)^2 dy$
$= 9.795 u^3$
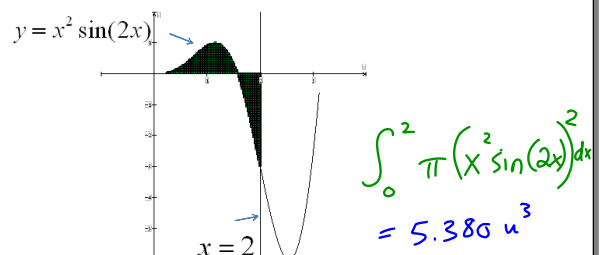$\pi \int_0^{\sqrt{3}} y^4 dy$
$\pi \frac{1}{5} y^5 \Big|_0^{\sqrt{3}}$

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c.) Find the volume of the solid formed by revolving the area bounded by $y = \sqrt{x}$, y-axis, x= 3 and y=-2 around the line y=-2.

x= 3

$r = \sqrt{x} + 2$
$\int_0^3 \pi (\sqrt{x} + 2)^2 dx$
$= 95.368 u^3$

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Ex3. Find the volume formed by revolving the shaded area around the x-axis.

$y = x^2 \sin(2x)$

$x = 2$

$\int_0^2 \pi (x^2 \sin(2x))^2 dx$
$= 5.380 u^3$

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Homework

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