7.2abc Volumes Practice Mini-WS Name: _____ Period:____

1)

Let the region R be the area enclosed the function $f(x) = x^3 + 1$, the horizontal line $y = 9$, and the y-axis. Find the volume of the solid generated when the region R

a) is revolved about the line y = 9

b) is revolved about the line x = -1

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3)

Let the region R be the area enclosed by the function $f(x) = x^3$, the horizontal line $y = 8$, and the y-axis. If the region R is the base of a solid such that each cross section perpendicular to the x-axis is a rectangle whose height is half the length of its base in the region R, find the volume of the solid. You may use a calculator and round to the nearest thousandth.

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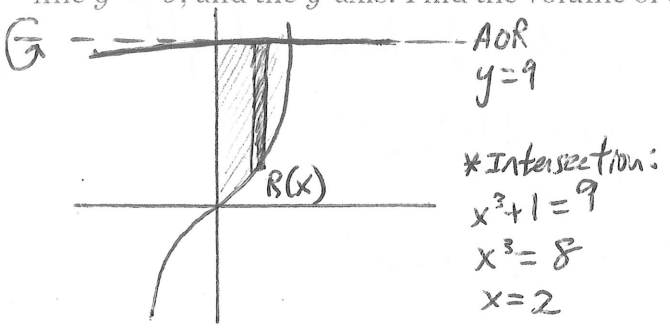


*Intersection:
$x^3+1=9$
$x^3=8$
$x=2$

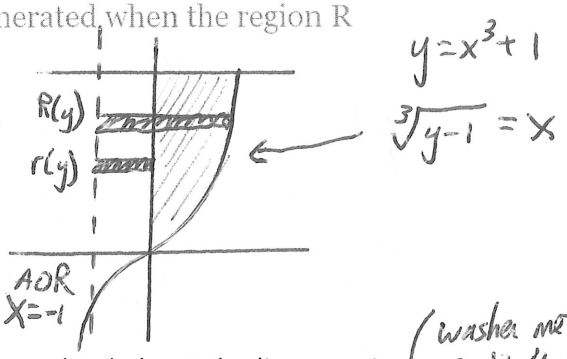
a) is revolved about the line y = 9

Disc Method (Top/Bottom)

$R(x) = 9-(x^3+1) = 9-x^3-1 = 8-x^3$

$V = \pi\int_0^2 [8-x^3]^2\,dx$

$V = \frac{576}{7}\pi$ or 82.286π units^3



$y = x^3+1$

$\sqrt[3]{y-1} = x$

b) is revolved about the line x = -1 (washer method Right/Left)

$R(y) = \sqrt[3]{y-1} - (-1) = \sqrt[3]{y-1} + 1$

$r(y) = 0-(-1) = 1$

$V = \pi\int_0^9 [\sqrt[3]{y-1}+1]^2 - [1]^2\,dy = 42.3\pi$ units^3

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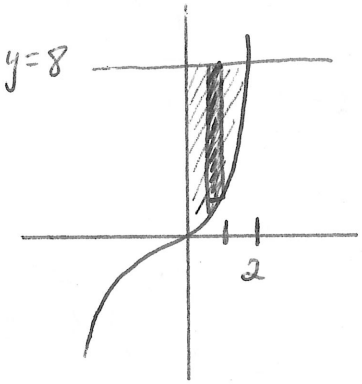

*intersection:

$x^3 = 8$

$\boxed{x = 2}$

$\text{base} = 8 - x^3$

$\text{Area(rectangle)} = \text{base} \times \text{height}$

$\text{height} = \frac{1}{2}(8 - x^3)$

$\text{Area} = \frac{1}{2}(8 - x^3)^2$

$V = \frac{1}{2}\int_0^2 (8 - x^3)^2 \, dx$

$\boxed{V = 41.143 \text{ units}^3}$

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