AP Calc Quiz Review 8.3 Name_____

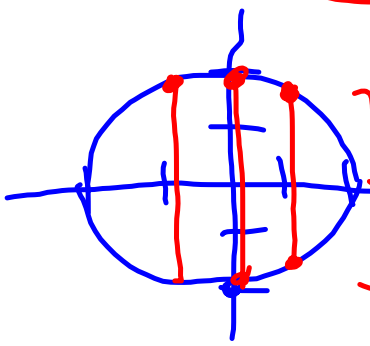
Period_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

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

1) 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 bases run from the semicircle $y = -\sqrt{4 - x^2}$ to the semicircle $y = \sqrt{4 - x^2}$. 1) _

A) $2\sqrt{4 - x^2}$ B) $4(4 - x^2)$ C) $2(4 - x^2)$ D) $\sqrt{4 - x^2}$



$s = 2\sqrt{4-x^2}$

$\sqrt{4-x^2}$ $s = 2\sqrt{4-x^2}$

$\sqrt{4-x^2}$

$A = s^2$

$A = (2\sqrt{4-x^2})^2$

$A = 4(4-x^2)$

$A = 16 - 4x^2$

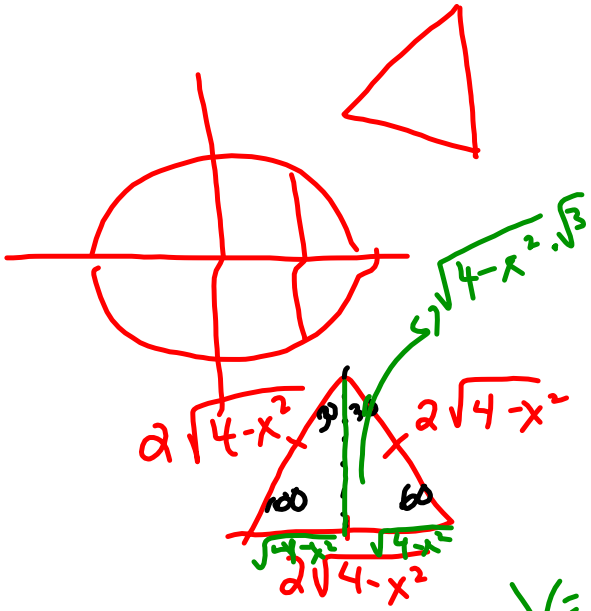
$$V = \int_{-2}^{2} 16 - 4x^2 \, dx$$

$$V = 2\left[16x - \frac{4x^3}{3}\Big|_{0}^{2}\right]$$

$$\left(\frac{32}{1} - \frac{32}{3}\right) - \left(0\right)$$

$$\frac{96}{3} - \frac{32}{3}$$

$$2\left(\frac{64}{3}\right) = \frac{128}{3}\,u^3$$



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

$A = \frac{1}{2}\left(2\sqrt{4-x^2}\right)\left(\sqrt{4-x^2}\cdot\sqrt{3}\right)$

$A = \sqrt{3}(4-x^2)$

$V = \sqrt{3}\int_{-2}^{2} 4-x^2\,dx$

$2\sqrt{3}\left[4x-\frac{x^3}{3}\Big|_0^2\right]$

$2\sqrt{3}\left[\left(8-\frac{8}{3}\right)-(0)\right]$

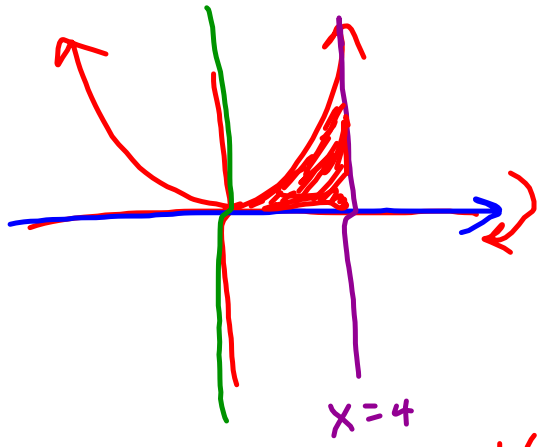
$\frac{24}{3}-\frac{8}{3}$

$2\sqrt{3}\,\frac{16}{3} = \frac{32\sqrt{3}}{3}u^3$

Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x

2) $y = x^2$, $y = 0$, $x = 0$, $x = 4$ 2) _

A) 256π B) $\frac{1024}{5}\pi$ C) 64π D) $\frac{64}{3}\pi$



circles

$A = \pi r^2$ ✓

$r = x^2$

$r^2 = x^4$

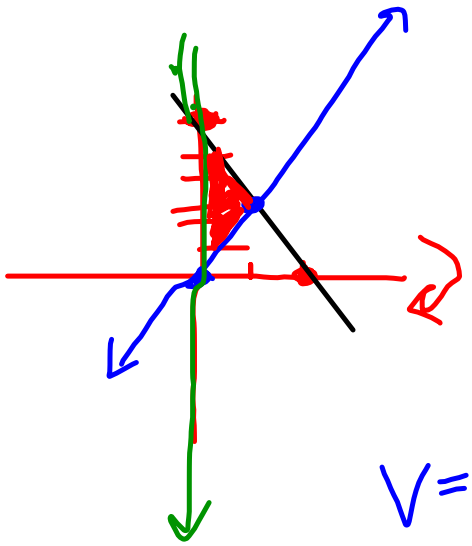
$$V = \pi \int_0^4 x^4 \, dx$$

$$V = \pi \left. \frac{x^5}{5} \right|_0^4$$

$$V = \pi \frac{1024}{5} = \boxed{\frac{1024\pi}{5} u^3}$$

3) $y = -3x + 6,\ y = 3x,\ x = 0$ 3) ____

A) 9π B) 6π C) 54π D) 18π



washer

$A = \pi(R^2 - r^2)$

$R^2 = (-3x+6)^2$

$r^2 = (3x)^2$

$$V = \pi \int_0^1 (-3x+6)^2 - (3x)^2 \, dx$$

$(-3x+6)(-3x+6)$

$9x^2 - 36x + 36 - 9x^2$

$$V = \pi \int_0^1 -36x + 36 \, dx$$

$\frac{-36x^2}{2}$

$$\pi \left[-18x^2 + 36x \Big|_0^1 \right]$$

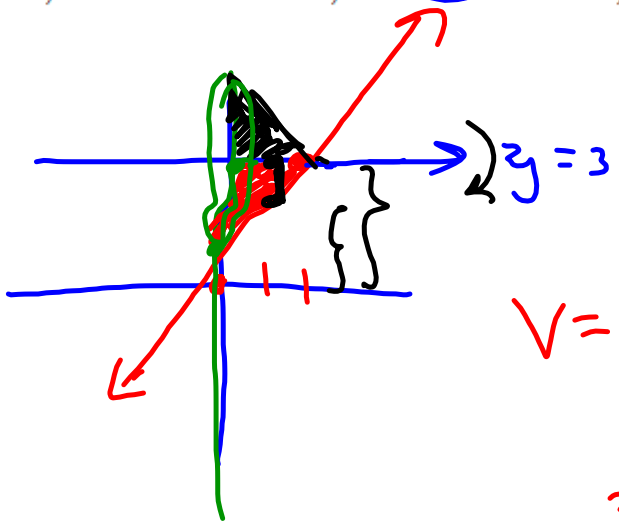
$$\pi \left[(-18 + 36) - (0) \right]$$

$18\pi u^3$

Find the volume of the solid generated by revolving the region about the given line.

4) The region in the first quadrant bounded above by the line $y = 3$, below by the line $y = \frac{3x}{2}$, and on the left by the y-axis, about the line $y = 3$ 4) _

A) 6π B) 3π C) 42π D) 4π



Circles

$A = \pi r^2$

$r = 3 - \frac{3}{2}x$

$$V = \pi \int_0^2 \left(3 - \frac{3}{2}x\right)^2 dx$$

$$\left(3 - \frac{3}{2}x\right)\left(3 - \frac{3}{2}x\right)$$

$$V = \pi \int_0^2 9 - 9x + \frac{9}{4}x^2 \, dx$$

$$\pi \left[9x - \frac{9x^2}{2} + \frac{9x^3}{12}\right]_0^2$$

$$\pi \left[9x - \frac{9}{2}x^2 + \frac{3}{4}x^3\right]_0^2$$

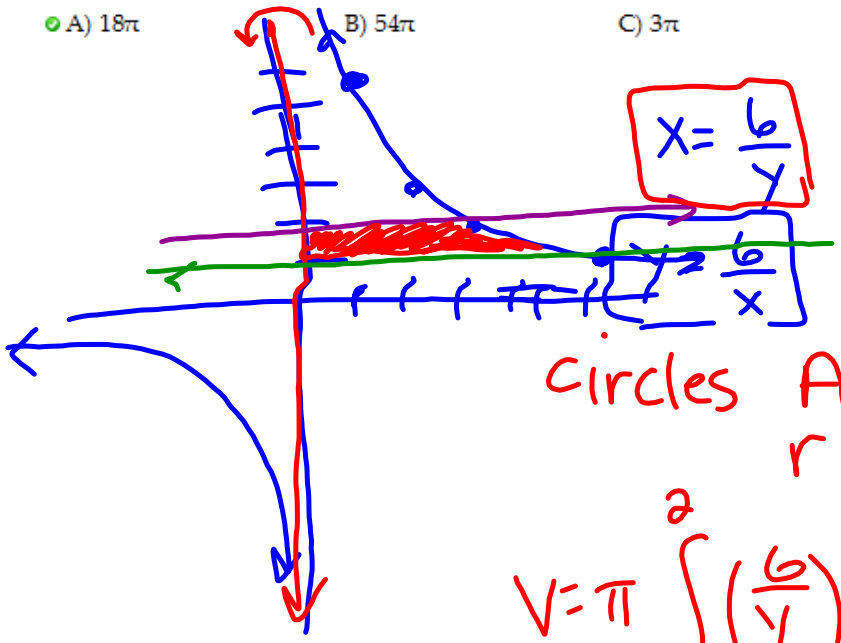
$$\pi \left[(18 - 18 + 6) - (0)\right]$$

$$\boxed{6\pi \text{ u}^3}$$

Find the volume of the solid generated by revolving the region about the y-axis.

5) The region enclosed by $x = \frac{6}{y}$, $x = 0$, $y = 1$, $y = 2$ 5) ____

A) 18π B) 54π C) 3π D) 9π



circles $A = \pi r^2$

$r = \frac{6}{y}$

$V = \pi \int_1^2 \left(\frac{6}{y}\right)^2 dy$

$V = \pi \int_1^2 \frac{36}{y^2} dy$ → $36y^{-2}$

$\pi \left[\frac{36y^{-1}}{-1}\Big|_1^2\right]$

$\pi \left[-\frac{36}{y}\Big|_1^2\right]$

$\pi\left[(-18) - (-36)\right]$

$-18 + 36$

$18\pi u^3$