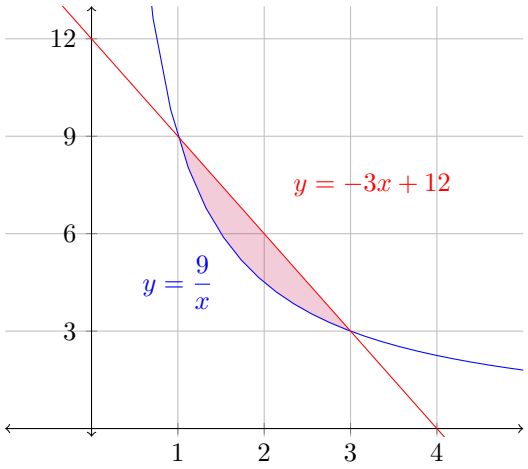
MATH 16020: Applied Calculus 2 Quiz 6 (Solutions) Wed, Feb. 22, 2023

Please show **all** your work! Answers without supporting work will not be given credit. Write answers in spaces provided.

Name:_____

1. **[5 pts]** Let R be the region shown below. Set up the integral that computes the **VOLUME** as R is rotated around the x-axis.

   DON'T COMPUTE IT!!!



Solution: Using the graph, we can see both lines intersect at $x = 1, 3$ which will be our bounds. **[1 pt]**.

We can also this is a WASHER PROBLEM. So the top function is $y = -3x + 12$ and the bottom function is $y = \dfrac{9}{x}$. **[2 pts]**.

Hence if we put it all together

$$\text{Volume} = \pi \int_1^3 (-3x + 12)^2 - \left(\frac{9}{x}\right)^2 \, dx \qquad \textbf{[2 pts]}$$

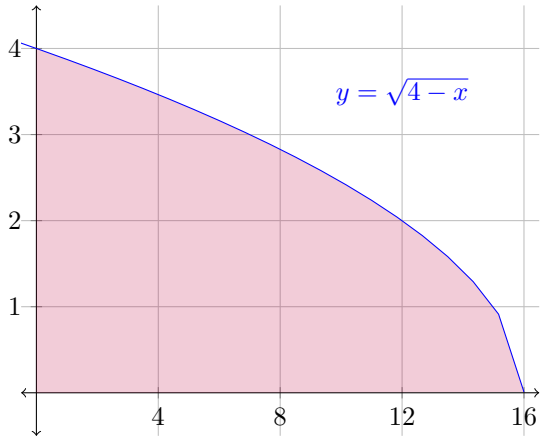
2. **[5 pts]** Set up the integral that computes the **VOLUME** of the region bounded by

$$y = \sqrt{16 - x}, \quad y = 0 \quad \text{and} \quad x = 0$$

around the y-axis.

DON'T COMPUTE IT!!!

Solution:



Note this a dy-problem because we are rotating around the y-axis. **[1pt]**.

After drawing the image on the right, we see that the bounds of our integral is $y = 0, 4$ **[1 pt]**.

We can also see this is a DISK PROBLEM and a dy Problem. So we need to solve $y = \sqrt{4 - x}$ for x. **[1 pt]**

$$y = \sqrt{16 - x}$$
$$y^2 = 16 - x$$
$$x = 16 - y^2$$

Hence if we put it all together

$$Volume = \pi \int_0^4 \left(16 - y^2\right)^2 \, dy \quad \textbf{[2 pts]}$$