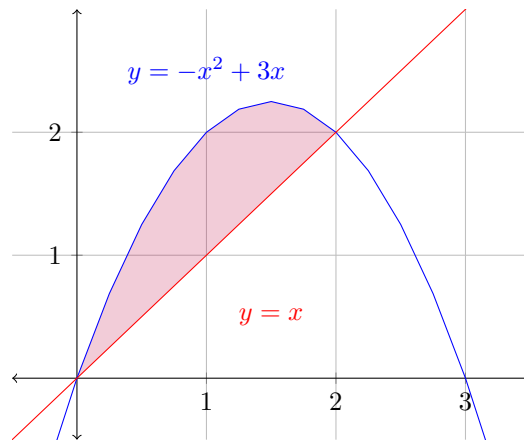> Please show **all** your work! Answers without supporting work will not be given credit. Write answers in spaces provided.

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 $x = 0, 2$ which will be our bounds. [**1 pt**].

We can also this is a WASHER PROBLEM. So the top function is $y = -x^2 + 3x$ and the bottom function is $y = x$. [**2 pts**].

Hence if we put it all together

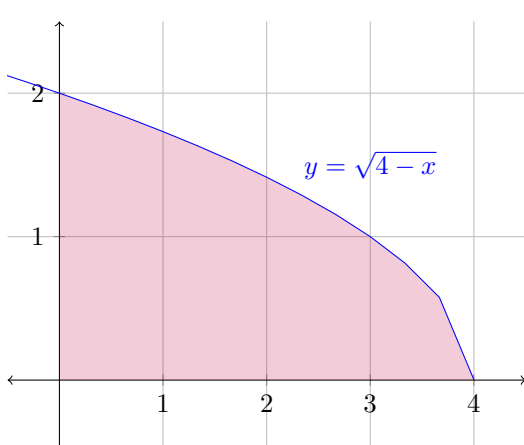$$\text{Volume} = \pi \int_0^2 \left(-x^2 + 3x\right)^2 - (x)^2 \ dx \quad [\textbf{2 pts}]$$

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

$$y = \sqrt{4-x}, \quad y = 0, \quad x = 0$$

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 $y = 0, 2$ **[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]**

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

Hence if we put it all together

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