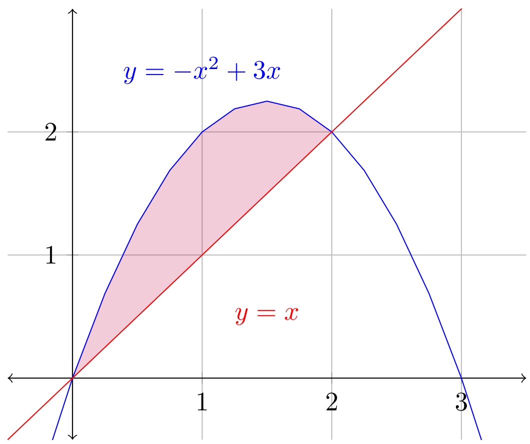
MATH 16020: Applied Calculus 2 Quiz 5 (Solutions) Wed, Oct. 5, 2022

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

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

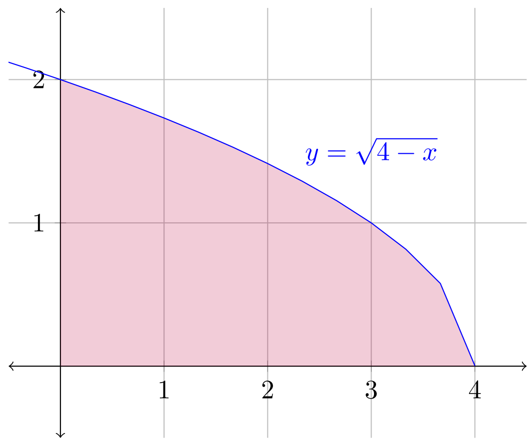
2. **[5 pts]** Set up the integral that computes the **VOLUME** of the region bounded by

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

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]**

$$\begin{aligned} y &= \sqrt{4-x} \\ y^2 &= 4-x \\ x &= 4-y^2 \end{aligned}$$

Hence if we put it all together

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

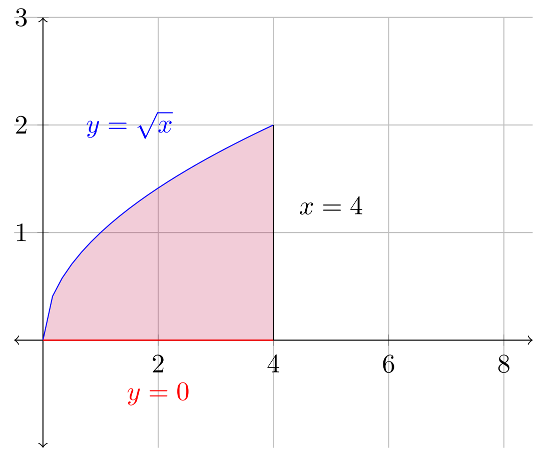
MATH 16020: Applied Calculus 2 Quiz 6 (Solutions) Wed, Oct. 12, 2022

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 $x = 4$.

DON'T COMPUTE IT!!!



Solution: If we reflect the region given in the graph across the line $x = 4$, we can see that this problem is a DISK PROBLEM. So, we need to solve $y = \sqrt{x}$ for x. **[1 pt]**

$$y = \sqrt{x} \iff y^2 = x$$

Since we are rotating around $x = 4$, our integral will be a dy-problem. **[1 pt]**

Using the graph, we can see our bounds will be 0 to 2. **[1 pt]**.

Hence if we put it all together

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

2. [**5 pts**] Using the **SHELL METHOD**, set up the integral that computes the **VOLUME** of the region bounded by

$$x = y^2 - 2y - 8, \quad \text{and} \quad x = 0$$

around the x-axis.

DON'T COMPUTE IT!!!

Solution: By the Shell Method, this a dy-problem because we are rotating around the x-axis. [**1pt**]

Next let's find the bounds of the integral by setting the equations equal. [**2 pts**]

$$\begin{aligned} 0 = x &= y^2 - 2y - 8 \\ 0 &= (y+2)(y-4) \\ y &= -2, 4 \end{aligned}$$

Hence if we put it all together

$$Volume = \int_{-2}^{4} 2\pi y \left(y^2 - 2y - 8\right)\, dy \quad [\textbf{2 pts}]$$