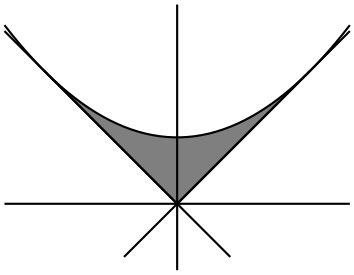
5. (12 total points) Let S be the region enclosed by the curves $y = x$, $y = -x$ and $2y = x^2 + 1$.



(a) (6 points) Find the volume of the solid obtained by rotating S about the x-axis.

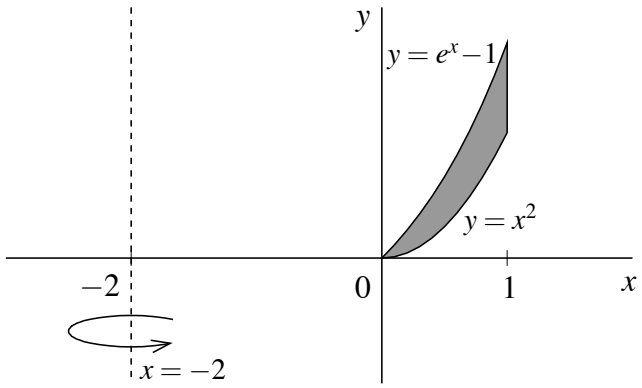
(b) (6 points) Find the volume of the solid obtained by rotating S about the y-axis.

6. (12 total points) Let R be the region bounded by the curves $y = x^2$, $y = \sin(\pi x/2)$, $x = 0$, and $x = 1$.

   (a) (8 points) Find the volume of the solid obtained by rotating R around the y-axis.

   (b) (4 points) Set up, BUT DO NOT EVALUATE, an integral to compute the volume of the solid obtained by rotating R about the horizontal line $y = -2$.

4. (8 total points) The region between $y = x^2$, $y = e^x - 1$, $x = 0$, and $x = 1$ is rotated about the vertical line $x = -2$ to form a solid.



(a) (4 points) Set up an integral for the volume of this solid using *CYLINDRICAL SHELLS*. *DO NOT EVALUATE THE INTEGRAL*.

(b) (4 points) Set up an integral (or integrals) for the volume of this solid using *WASHERS*. *DO NOT EVALUATE THE INTEGRAL(S)*.

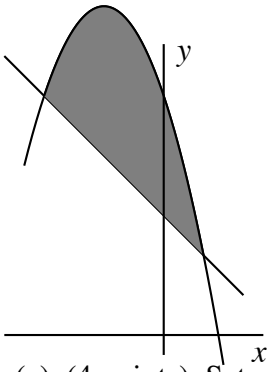
7. (8 points) Let R be the region below the curve $y = \dfrac{1}{x}$, above the x-axis, and between the vertical lines $x = 1$ and $x = 3$. Set up and evaluate a definite integral for the volume of the solid obtained by rotating R about the vertical line $x = -2$.

7. (10 total points)

   (a) (6 points) The region in the first quadrant bounded by the x-axis, the y-axis, the line $x = 2$, and the graph of $y = \dfrac{1}{1+x^2}$ is rotated around the y-axis to form a solid of revolution. Find the volume of this solid.

   (b) (4 points) The region in the first quadrant bounded by the x-axis, the line $x = 4$, and the graph of $y = \sqrt{x}$ is rotated around the *horizontal* line $y = 3$ to form a solid of revolution. Express the volume of this solid as a definite integral, but DO NOT EVALUATE THIS INTEGRAL.

7. (8 total points) Let R be the region bounded by $y = -x^2 - 3x + 6$ and $x + y - 3 = 0$; see the picture.



(a) (4 points) Set up an integral for the volume obtained by rotating R about the vertical line $x = 3$. DO NOT EVALUATE THE INTEGRAL.

(b) (4 points) Set up an integral for the volume obtained by rotating R about the horizontal line $y = 0$. DO NOT EVALUATE THE INTEGRAL.