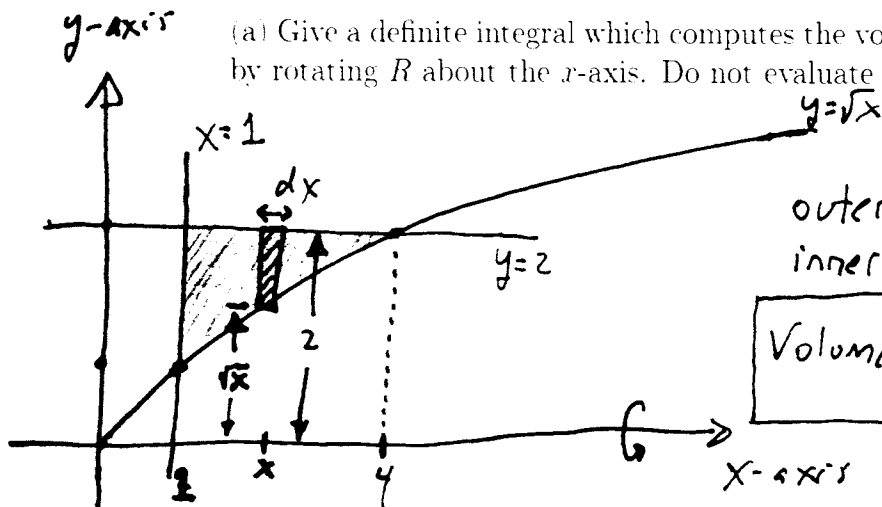


Name: Solutions

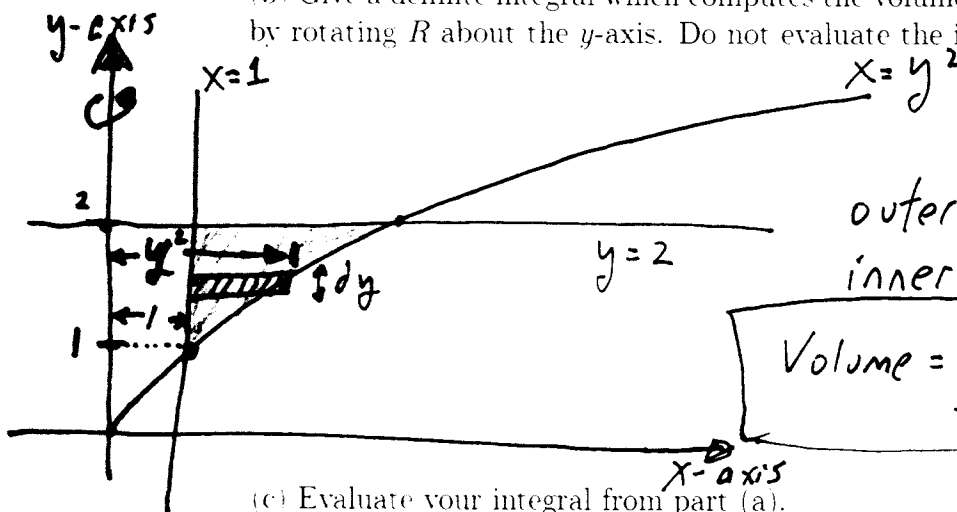
(20 points total)

1. (20 points) Consider the region  $R$  bounded by  $x = 1$ ,  $y = 2$ , and  $y = \sqrt{x}$ .(a) Give a definite integral which computes the volume of the solid generated by rotating  $R$  about the  $x$ -axis. Do not evaluate the integral.

outer radius = 2

inner radius =  $\sqrt{x}$ 

$$\text{Volume} = \int_1^4 \pi (2^2 - (\sqrt{x})^2) dx$$

(b) Give a definite integral which computes the volume of the solid generated by rotating  $R$  about the  $y$ -axis. Do not evaluate the integral.outer radius =  $y^2$ 

inner radius = 1

$$\text{Volume} = \int_1^2 \pi ((y^2)^2 - (1)^2) dy$$

(c) Evaluate your integral from part (a).

$$\begin{aligned} \int_1^4 \pi (4-x) dx &= \pi \left( 4x - \frac{x^2}{2} \right) \Big|_1^4 \\ &= \pi \left( 4(4) - \frac{(4)^2}{2} \right) - \pi \left( 4(1) - \frac{(1)^2}{2} \right) \\ &= \pi (16 - 8) - \pi \left( \frac{7}{2} \right) \\ &= \boxed{\frac{9}{2} \pi} \end{aligned}$$