(Ex) Find the volume of the solid generated by revolving the region bounded by the curves $y = x$, $y = \sqrt{x}$, $x = 0$ and $x = 1$ about the line $y = 1$.

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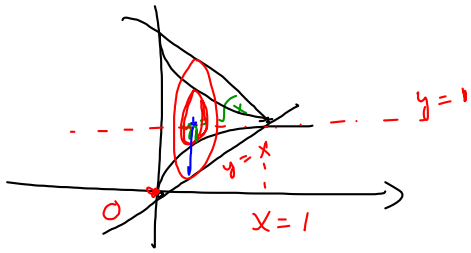


$R_{out} = 1 - x$

$r_{in} = 1 - \sqrt{x}$

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$$V = \int_0^1 \left(\pi R_{out}^2 - \pi r_{in}^2\right) dx$$

$$= \pi \int_0^1 \left[(1-x)^2 - (1-\sqrt{x})^2\right] dx$$

$$= \pi \int_0^1 \left[1 - 2x + x^2 - 1 + 2\sqrt{x} - x\right] dx$$

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$$V = \pi \int_0^1 \left[x^2 - 3x + 2\sqrt{x}\right] dx$$

$$V = \pi \left[\frac{x^3}{3} - \frac{3x^2}{2} + 2 \cdot \frac{2}{3} x^{3/2}\right]_0^1$$

$$V = \pi \left[\frac{1}{3} - \frac{3}{2} + \frac{4}{3}\right] = \boxed{\frac{\pi}{6}}$$

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