

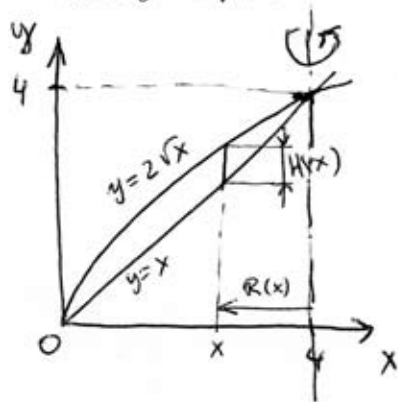
Test 1

Problem	1	2	3	4	5	6	7	8
Points								

NAME: Solution Key

Show all your work for full credit. Calculators, the textbook, and lecture notes are allowed.

Problem 1. Find the volume of the solid generated by revolving the plane region bounded by the curve $y = 2\sqrt{x}$ and the line $y = x$ about the line $x = 4$. Sketch the plane region.



Use the method of shells.

$$V = 2\pi \int_0^4 \underbrace{(4-x)}_{R(x)} \underbrace{(2\sqrt{x}-x)}_{H(x)} dx$$

$$= 2\pi \int_0^4 (8x^{1/2} - 2x^{3/2} - 4x + x^2) dx$$

$$= 2\pi \left(8 \cdot \frac{2}{3} x^{3/2} - 2 \cdot \frac{2}{5} x^{5/2} - 2x^2 + \frac{x^3}{3} \right) \Big|_0^4$$

$$= 2\pi \left(\frac{16 \cdot 8}{3} - \frac{4 \cdot 32}{5} - 32 + \frac{64}{3} \right)$$

$$= 2\pi \left(\frac{192}{3} - \frac{128}{5} - 32 \right) = 2\pi \frac{32}{5} = \frac{64\pi}{5}$$