

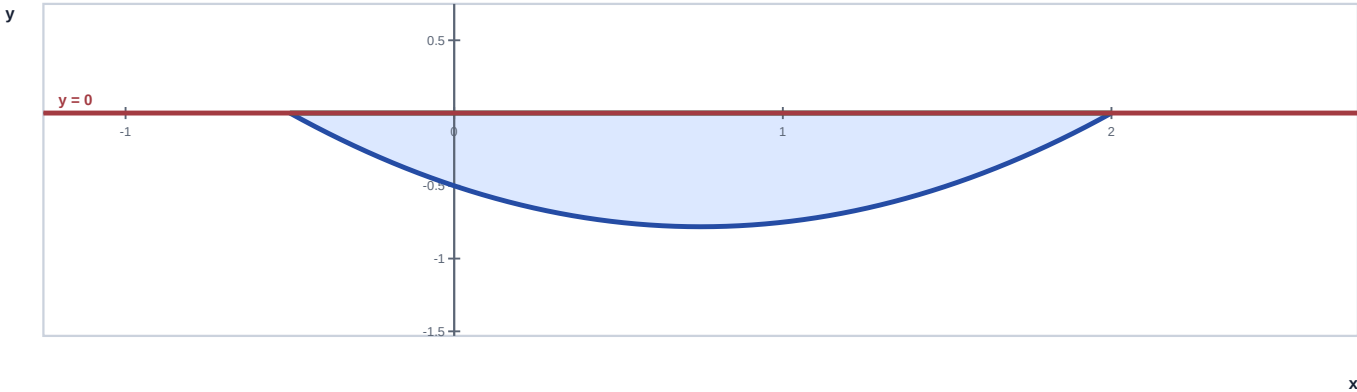
Volumes of Washers and Disks

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

1. Rotate the shaded region about the horizontal line $y = 0$.

$y = F(x) = \frac{1}{2} \cdot x^2 - \frac{3}{4} \cdot x - \frac{1}{2}$

$y = G(x) = 0$

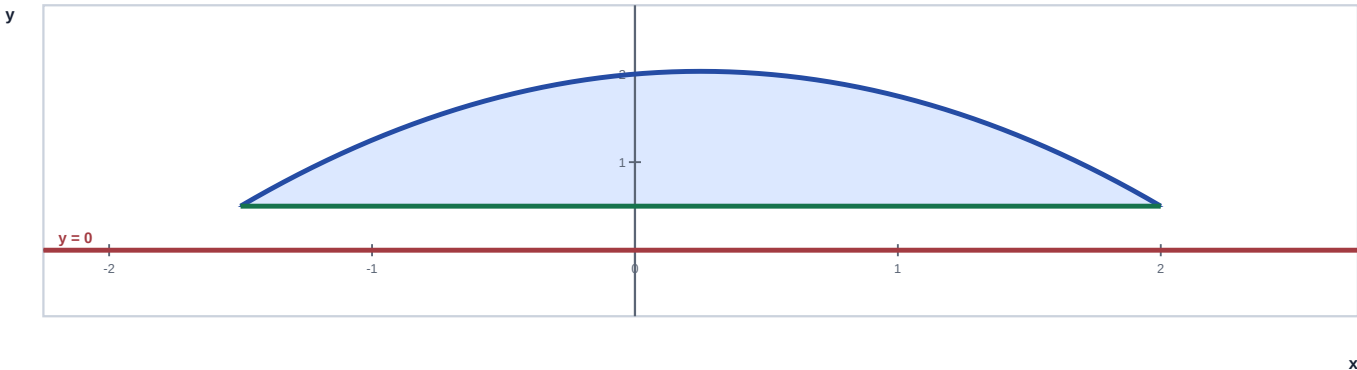


Show R, r, the washer/disk integral, and exact volume:

2. Rotate the shaded region about the horizontal line $y = 0$.

$y = F(x) = -\frac{1}{2} \cdot x^2 + \frac{1}{4} \cdot x + 2$

$y = G(x) = \frac{1}{2}$



Show R, r, the washer/disk integral, and exact volume:

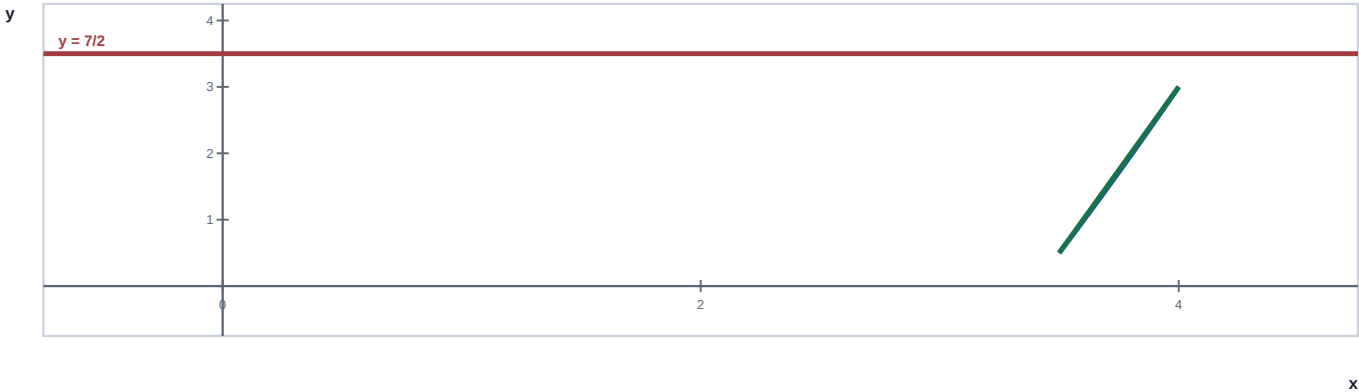
Volumes of Washers and Disks

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

3. Rotate the shaded region about the horizontal line $y = 7/2$.

$y = F(x) = \frac{1}{2} \cdot x^2 + \frac{5}{4} \cdot x - 10$

$y = G(x) = 5 \cdot x - 17$

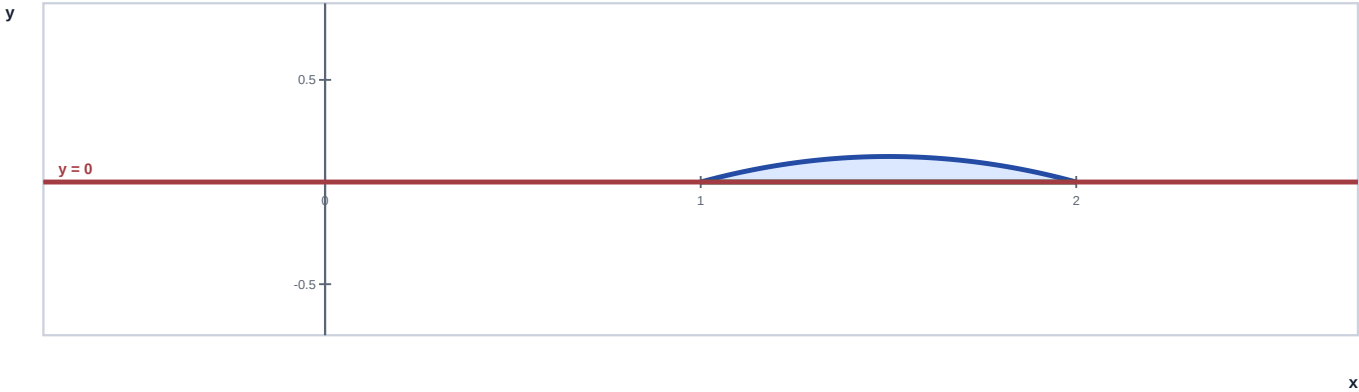


Show R, r, the washer/disk integral, and exact volume:

4. Rotate the shaded region about the horizontal line $y = 0$.

$y = F(x) = -\frac{1}{2} \cdot x^2 + \frac{3}{2} \cdot x - 1$

$y = G(x) = 0$



Show R, r, the washer/disk integral, and exact volume:

Volumes of Washers and Disks

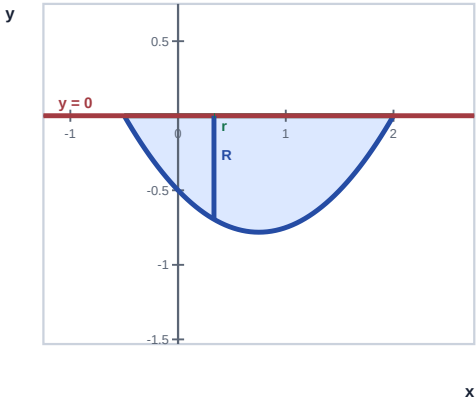
Worked Answer Key

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

1. Rotate about $y = 0$; limits $-1/2$ to 2 .

$F(x) = \frac{1}{2} \cdot x^2 - \frac{3}{4} \cdot x - \frac{1}{2}$

$G(x) = 0$



$R(x) = -\frac{1}{2} \cdot x^2 + \frac{3}{4} \cdot x + \frac{1}{2}$

$r(x) = 0$

$R^2(x) = \frac{1}{4} \cdot x^4 - \frac{3}{4} \cdot x^3 + \frac{1}{16} \cdot x^2 + \frac{3}{4} \cdot x + \frac{1}{4}$

$r^2(x) = 0$

$R^2 - r^2 = \frac{1}{4} \cdot x^4 - \frac{3}{4} \cdot x^3 + \frac{1}{16} \cdot x^2 + \frac{3}{4} \cdot x + \frac{1}{4}$

$\pi \int_{-1/2}^2 \frac{1}{4} \cdot x^4 - \frac{3}{4} \cdot x^3 + \frac{1}{16} \cdot x^2 + \frac{3}{4} \cdot x + \frac{1}{4} \, dx$

$P(x) = \frac{1}{20} \cdot x^5 - \frac{3}{16} \cdot x^4 + \frac{1}{48} \cdot x^3 + \frac{3}{8} \cdot x^2 + \frac{1}{4} \cdot x$

$P(2) - P(-1/2) = \frac{23}{30} - \left(\frac{-181}{3840} \right)$

$V = \frac{625}{768} \cdot \pi$

cubic units

Volumes of Washers and Disks

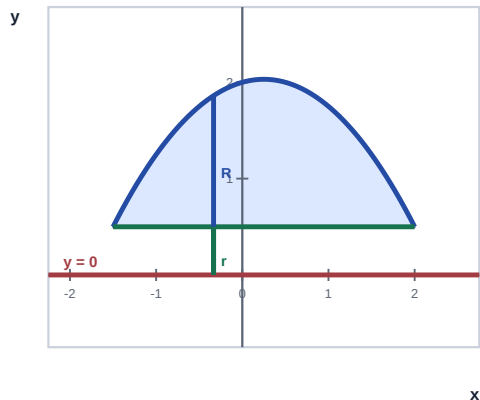
Worked Answer Key

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

2. Rotate about $y = 0$; limits $-3/2$ to 2 .

$$F(x) = -\frac{1}{2} \cdot x^2 + \frac{1}{4} \cdot x + 2$$

$$G(x) = \frac{1}{2}$$



$$R(x) = -\frac{1}{2} \cdot x^2 + \frac{1}{4} \cdot x + 2$$

$$r(x) = \frac{1}{2}$$

$$R^2(x) = \frac{1}{4} \cdot x^4 - \frac{1}{4} \cdot x^3 - \frac{31}{16} \cdot x^2 + x + 4$$

$$r^2(x) = \frac{1}{4}$$

$$R^2 - r^2 = \frac{1}{4} \cdot x^4 - \frac{1}{4} \cdot x^3 - \frac{31}{16} \cdot x^2 + x + \frac{15}{4}$$

$$\pi \int_{-3/2}^2 \left(\frac{1}{4} \cdot x^4 - \frac{1}{4} \cdot x^3 - \frac{31}{16} \cdot x^2 + x + \frac{15}{4} \right) dx$$

$$P(x) = \frac{1}{20} \cdot x^5 - \frac{1}{16} \cdot x^4 - \frac{31}{48} \cdot x^3 + \frac{1}{2} \cdot x^2 + \frac{15}{4} \cdot x$$

$$P(2) - P(-3/2) = \frac{74}{15} - \left(\frac{-3861}{1280} \right)$$

$$V = \frac{30527}{3840} \cdot \pi$$

cubic units

Volumes of Washers and Disks

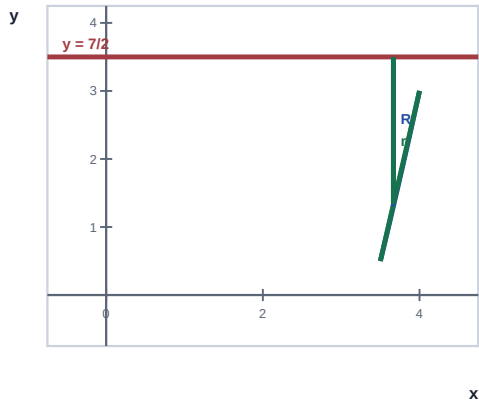
Worked Answer Key

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

3. Rotate about $y = 7/2$; limits $7/2$ to 4.

$$F(x) = \frac{1}{2} \cdot x^2 + \frac{5}{4} \cdot x - 10$$

$$G(x) = 5 \cdot x - 17$$



$$R(x) = -\frac{1}{2} \cdot x^2 - \frac{5}{4} \cdot x + \frac{27}{2}$$

$$r(x) = -5 \cdot x + \frac{41}{2}$$

$$R^2(x) = \frac{1}{4} \cdot x^4 + \frac{5}{4} \cdot x^3 - \frac{191}{16} \cdot x^2 - \frac{135}{4} \cdot x + \frac{729}{4}$$

$$r^2(x) = 25 \cdot x^2 - 205 \cdot x + \frac{1681}{4}$$

$$R^2 - r^2 = \frac{1}{4} \cdot x^4 + \frac{5}{4} \cdot x^3 - \frac{591}{16} \cdot x^2 + \frac{685}{4} \cdot x - 238$$

$$\pi \int_{\frac{7}{2}}^4 \left(\frac{1}{4} \cdot x^4 + \frac{5}{4} \cdot x^3 - \frac{591}{16} \cdot x^2 + \frac{685}{4} \cdot x - 238 \right) dx$$

$$P(x) = \frac{1}{20} \cdot x^5 + \frac{5}{16} \cdot x^4 - \frac{197}{16} \cdot x^3 + \frac{685}{8} \cdot x^2 - 238 \cdot x$$

$$P(4) - P(7/2) = \frac{-1194}{5} - \left(\frac{-305711}{1280} \right)$$

$$V = \frac{47}{1280} \cdot \pi$$

cubic units

Volumes of Washers and Disks

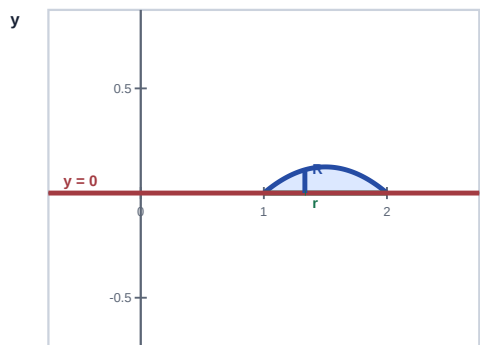
Worked Answer Key

Use washers or disks to find each exact volume. Show the radii, setup, and evaluation.

4. Rotate about $y = 0$; limits 1 to 2.

$$F(x) = -\frac{1}{2} \cdot x^2 + \frac{3}{2} \cdot x - 1$$

$$G(x) = 0$$



$$R(x) = -\frac{1}{2} \cdot x^2 + \frac{3}{2} \cdot x - 1$$

$$r(x) = 0$$

$$R^2(x) = \frac{1}{4} \cdot x^4 - \frac{3}{2} \cdot x^3 + \frac{13}{4} \cdot x^2 - 3 \cdot x + 1$$

$$r^2(x) = 0$$

$$R^2 - r^2 = \frac{1}{4} \cdot x^4 - \frac{3}{2} \cdot x^3 + \frac{13}{4} \cdot x^2 - 3 \cdot x + 1$$

$$\pi \int_1^2 \left(\frac{1}{4} \cdot x^4 - \frac{3}{2} \cdot x^3 + \frac{13}{4} \cdot x^2 - 3 \cdot x + 1 \right) dx$$

$$P(x) = \frac{1}{20} \cdot x^5 - \frac{3}{8} \cdot x^4 + \frac{13}{12} \cdot x^3 - \frac{3}{2} \cdot x^2 + x$$

$$P(2) - P(1) = \frac{4}{15} - \left(\frac{31}{120} \right)$$

$$V = \frac{1}{120} \cdot \pi$$

cubic units