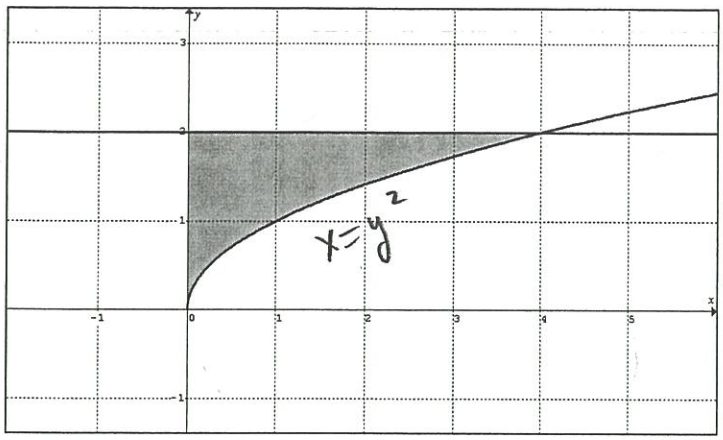
BC, Q3Q2.CH7.LESSON 2 HOMEWORK SOLUTIONS



1. Let R be the shaded region enclosed by the graphs of $y = \sqrt{x}$, $y = 2$, and the y-axis as shown in the figure above.

a. Find the area of region R. *LESSON 1* $A = \frac{8}{3}$

b. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the x-axis.

$$V = \pi \int_0^4 \left[(2)^2 - (\sqrt{x})^2\right] dx$$

c. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = 3$.

$$V = \pi \int_0^4 \left[(3-\sqrt{x})^2 - (3-2)^2\right] dx$$

d. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = -1$.

$$V = \pi \int_0^4 \left[(2+1)^2 - (\sqrt{x}+1)^2\right] dx$$

e. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the y – axis.

$$V = \pi \int_{y=0}^{y=2} \left[(y^2)^2 - (0)^2\right] dy \quad (\text{OR}) \quad V = \int_0^4 2\pi x \left[2 - \sqrt{x}\right] dx$$

f. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = 5$.

$$V = \pi \int_0^2 \left[(5-0)^2 - (5-y^2)^2\right] dy \quad (\text{OR}) \quad V = \int_0^4 2\pi (5-x)\left[2-\sqrt{x}\right] dx$$

g. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = -2$.

$$V = \pi \int_6^2 \left[(y^2+2)^2 - (0+2)^2\right] dy \quad (\text{OR}) \quad V = \int_0^4 2\pi (x+2)\left[2-\sqrt{x}\right] dx$$

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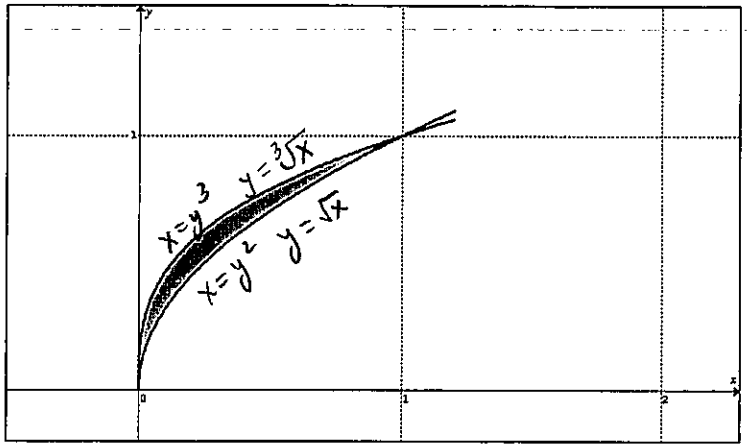

2. Let R be the shaded region enclosed by the graphs of $x = y^3$, $x = y^2$, and the x-axis as shown in the figure above.

a. Find the area of region R. . *LESSON 1*

b. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the x-axis.

$$V = \pi \int_0^1 \left[\left(x^{1/3}\right)^2 - \left(x^{1/2}\right)^2 \right] dx$$

c. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = 8$.

$$V = \pi \int_0^1 \left[(8 - \sqrt{x})^2 - (8 - \sqrt[3]{x})^2 \right] dx$$

d. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = -2$.

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

e. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the y – axis.

$$V = \pi \int_{y=0}^{y=1} \left[\left(y^2\right)^2 - \left(y^3\right)^2 \right] dy \qquad (\text{OR}) \quad V = \int_0^1 2\pi x \left[\sqrt[3]{x} - \sqrt{x} \right] dx$$

f. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = 4$.

$$V = \pi \int_0^1 \left[(4 - y^3)^2 - (4 - y^2)^2 \right] dy \quad (\text{or}) \quad V = \int_0^1 2\pi (4 - x) \left[\sqrt[3]{x} - \sqrt{x} \right] dx$$

g. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = -3$.

$$V = \pi \int_0^1 \left[(y^2 + 3)^2 - (y^3 + 3)^2 \right] dy \quad (\text{or}) \quad V = \int_0^1 2\pi (x + 3) \left[\sqrt[3]{x} - \sqrt{x} \right] dx$$

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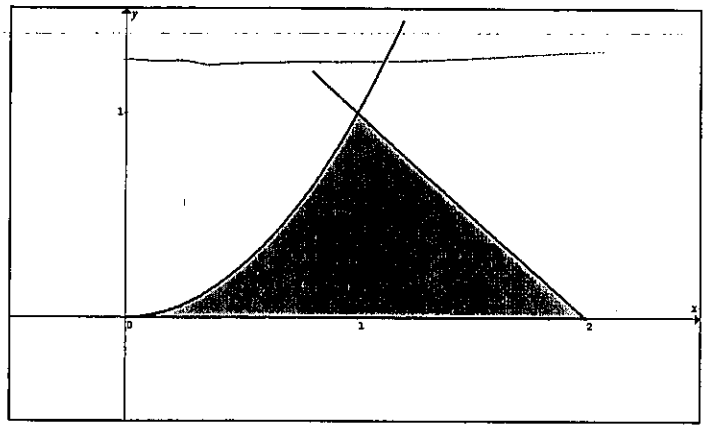

3. Let R be the shaded region enclosed by the graphs of $y = x^2$, $x + y = 2$, and the x-axis as shown in the figure above.

$y = 2 - x$

a. Find the area of region R. . *LESSON 1* $A = \frac{5}{6}$

b. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the x-axis.

$$V = \pi \int_0^1 (x^2)^2 dx + \pi \int_1^2 (2-x)^2 dx \quad \text{(or)} \quad V = \int_0^1 2\pi y \left[(2-y) - \sqrt{y}\right] dy$$

c. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = 2$.

$$V = \pi \int_0^1 \left[(2-0)^2 - (2-x^2)^2\right] dx + \pi \int_1^2 \left[(2-0)^2 - (2-(2-x))^2\right] dx$$

$\rightarrow$ (or) $V = \int_0^1 2\pi (2-y)\left[(2-y) - \sqrt{y}\right] dy$

d. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $y = -7$.

$$V = \pi \int_0^1 \left[(x^2+7)^2 - (0+7)^2\right] dx + \pi \int_1^2 \left[(2-x+7)^2 - (0+7)^2\right] dx$$

e. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the y – axis.

$$V = \pi \int_{y=0}^{y=1} \left[(2-y)^2 - (\sqrt{y})^2\right] dy$$

f. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = 5$.

$$V = \pi \int_0^1 \left[(5-\sqrt{y})^2 - (5-(2-y))^2\right] dy$$

g. Set up, but do not solve and expression involving one or more integrals, use to find the volume of the solid if R is revolved around the line $x = -10$.

$$V = \pi \int_0^1 \left[(2-y+10)^2 - (\sqrt{y}+10)^2\right] dy$$

$\rightarrow$ (or) $V = \int_0^1 2\pi (y+7)\left[(2-y) - \sqrt{y}\right] dy$

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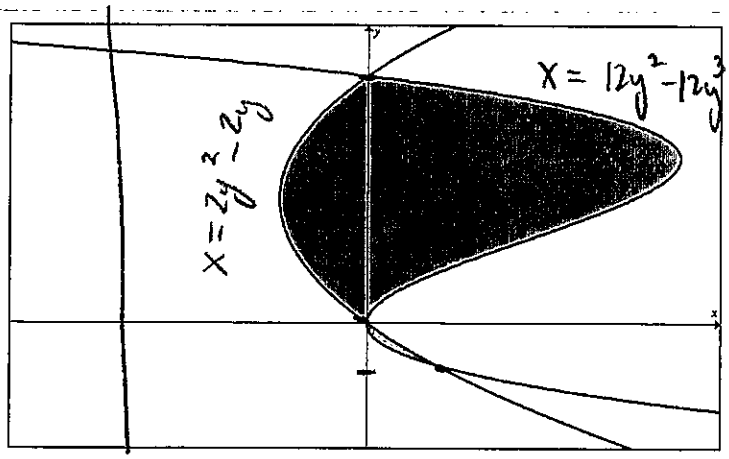


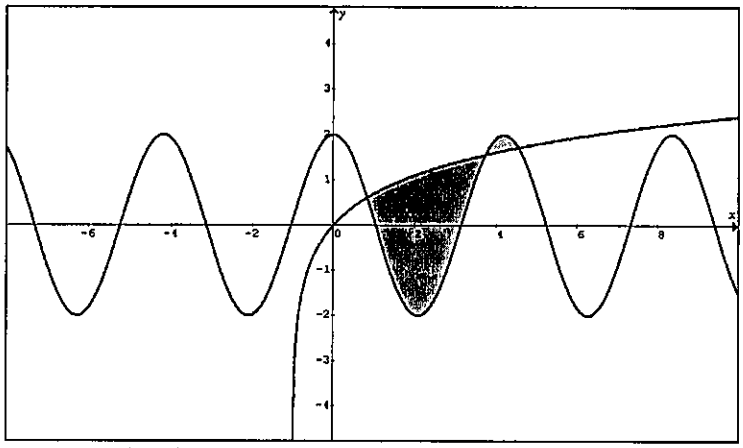
CALCULTOR PERMITTED

4. Let R be the shaded region enclosed by the graphs of $x = 2y^2 - 2y$ and $x = 12y^2 - 12y^3$ as shown in the figure above. Find the volume of the solid if R is revolved around the line $x = -2$.

$$V = \pi \int_{-1/6}^{0} \left[(2y^2 - 2y + 2)^2 - (12y^2 - 12y^3 + 2)^2 \right] dy + \pi \int_{0}^{1} \left[(12y^2 - 12y^3 + 2)^2 - (2y^2 - 2y + 2)^2 \right] dy$$

$$\approx \boxed{6.615\pi}$$

$$\approx \boxed{20.782}$$



CALCULTOR REQUIRED

5. Let R be the shaded region enclosed by the graphs of $f(x) = 2\cos(1.5x)$ and $g(x) = \ln(x+1)$ as shown in the figure above.

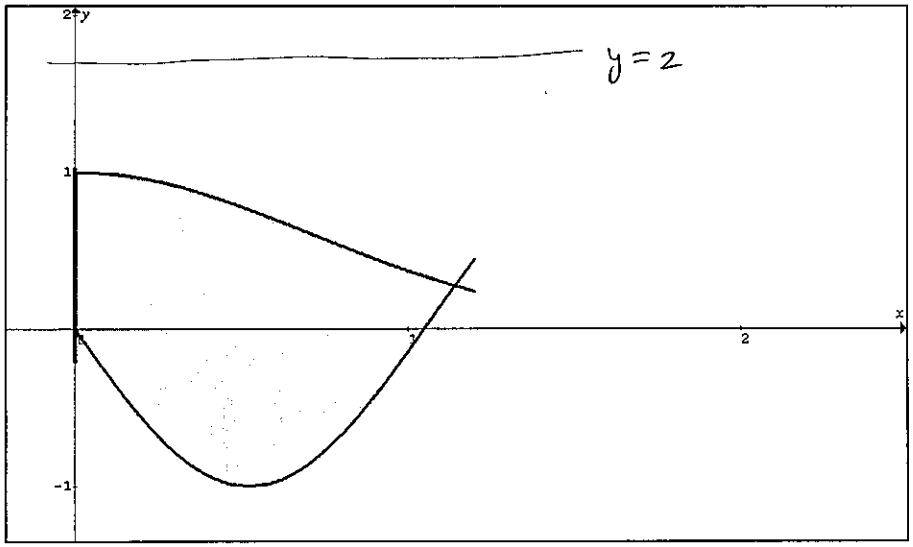
A. Find the area of region R.

$$A = \int_{0.841}^{3.735} [g(x) - f(x)]\,dx + \int_{3.735}^{4.550} [f(x) - g(x)]\,dx = \boxed{5.647}$$

B. Find the volume of the solid if R is revolved around the line $y = \pi$.

$$V = \pi \int_{0.841}^{3.735} \left[(\pi - f(x))^2 - (\pi - g(x))^2 \right] dx + \int_{3.735}^{4.550} \left[(\pi - g(x))^2 - (\pi - f(x))^2 \right] dx$$

$$= 109.791 + 1.651 = \boxed{111.442}$$



6. Let R be the shaded region enclosed by the graphs of $y = e^{-x^2}$, $y = -\sin(3x)$, and the y-axis as shown in the figure above.

a. Find the area of region R. *LESSON 1* $a = 1.139$

b. Find the volume of the solid if R is revolved around the line $y = 2$.

$$V = \pi \int_0^a \left[(2 + \sin(3x))^2 - (2 - e^{-x^2})^2 \right] dx = 17.890$$

c. Find the volume of the solid if R is revolved around the line $x = 4$.

$$V = \int_0^a 2\pi (4 - x)\left(e^{-x^2} + \sin(3x) \right) dx = 31.936$$

d. Find the volume of the solid if R is revolved around the line $x = -5$.

$$V = \int_0^a 2\pi (x + 5)\left(e^{-x^2} + \sin(3x) \right) dx = 49.795$$

NOTE * $\int(2 * \pi * (x+5) * (y1(x) - y2(x)), x, 0, 1.139)$