CALCULUS BC Name_____
WORKSHEET ON 7.2 – VOLUME BY DISCS & WASHERS

Do **not** use your calculator on problems 1 – 3. Draw a figure and shade the enclosed region. Then find the volume of the solid generated by revolving the given region about the given axis.

1. $y=\sqrt{x},\ y=0,\ x=4$ about the x-axis

2. $y=4-x^2,\ y=0,$ and the $y-$axis about the x-axis

3. $y=x^2$ and $y=x^3$ about the x-axis

Use your **calculator** on problems 4 – 6. Draw a figure and shade the enclosed region. Then find the volume of the solid generated by revolving the given region about the given axis by setting up an integral expression and then using your calculator. Give your answers correct to **three** decimal places.

4. $y=\sqrt{x},\ y=0,$ and $x=4$
(a) about the line $y=3$
(b) about the line $y=-2$

5. $y=x^2$ and $y=4x-x^2$
(a) about the x-axis
(b) about the line $y=6$
(c) about the line $y=-1$

6. $x=\sqrt{y}$ and $x=y^2$
(a) about the y-axis
(b) about the line $x=3$
(c) about the line $x=-2$

Answers to Worksheet on Volume by Discs and Washers

1. $V = \pi\int_0^4 \left(\sqrt{x}\right)^2 dx = ... = 8\pi$

2. $V = \pi\int_{-2}^2 \left(4 - x^2\right)^2 dx = ... = \dfrac{512\pi}{15}$

3. $V = \pi\int_0^1 \left(\left(x^2\right)^2 - \left(x^3\right)^2\right) dx = ... = \dfrac{2\pi}{35}$

4. (a) $V = \pi\int_0^4 \left(3^2 - \left(3 - \sqrt{x}\right)^2\right) dx = 75.398$ or 24π

   (b) $V = \pi\int_0^4 \left(\left(\sqrt{x} + 2\right)^2 - 2^2\right) dx = 92.153$ or $\dfrac{88\pi}{3}$

5. $x^2 = 4x - x^2$ at $x = 0$ and $x = 2$

   (a) $V = \pi\int_0^2 \left(\left(4x - x^2\right)^2 - \left(x^2\right)^2\right) dx = 33.510$ or $\dfrac{32\pi}{3}$

   (b) $V = \pi\int_0^2 \left(\left(6 - x^2\right)^2 - \left(6 - 4x + x^2\right)^2\right) dx = 67.021$ or $\dfrac{64\pi}{3}$

   (c) $V = \pi\int_0^2 \left(\left(4x - x^2 + 1\right)^2 - \left(x^2 + 1\right)^2\right) dx = 50.265$ or 16π

6. $\sqrt{y} = y^2$ at $y = 0$ and $y = 1$

   (a) $V = \pi\int_0^1 \left(\left(\sqrt{y}\right)^2 - \left(y^2\right)^2\right) dy = 0.942$

   (b) $V = \pi\int_0^1 \left(\left(3 - y^2\right)^2 - \left(3 - \sqrt{y}\right)^2\right) dy = 5.341$

   (c) $V = \pi\int_0^1 \left(\left(\sqrt{y} + 2\right)^2 - \left(y^2 + 2\right)^2\right) dy = 5.131$