Calculus

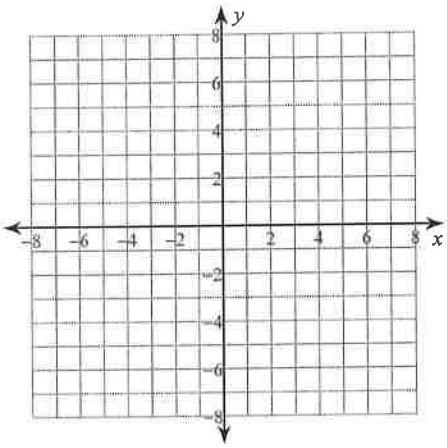
Name_____

Volume about Vertical Lines

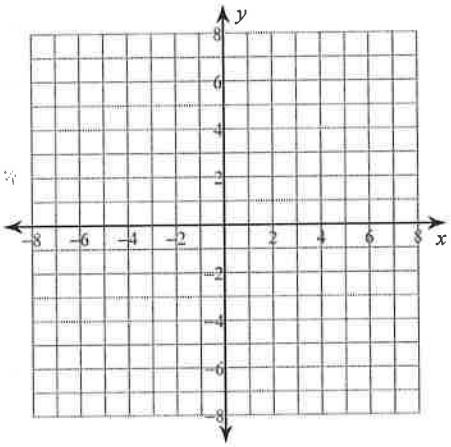
Date_____ Period____

For each problem, find the volume of the solid that results when the region enclosed by the curves is revolved about the y-axis. You may use the provided graph to sketch the curves and shade the enclosed region.

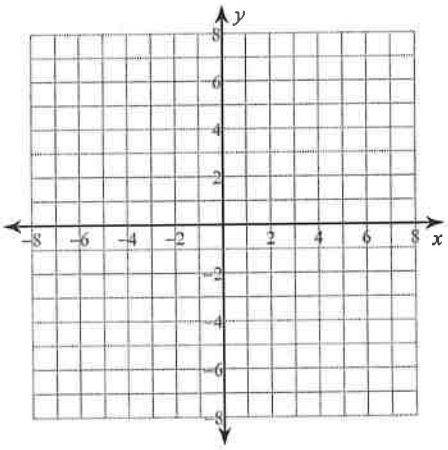
1) $x = \sqrt{y},\ x = 0,\ y = 4$



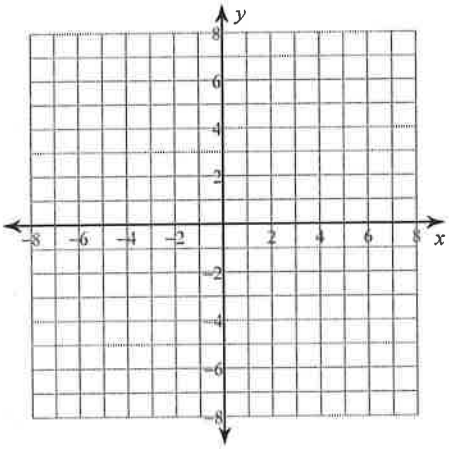
2) $x = y^2,\ x = 0,\ y = 1$



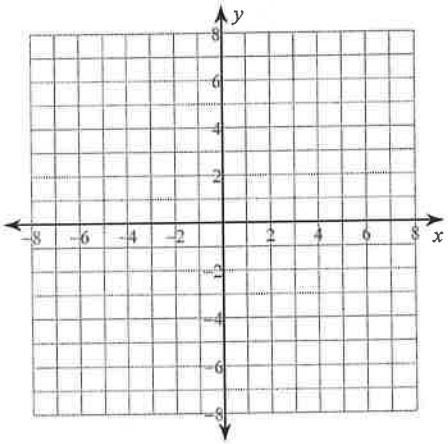
3) $x = -y^2 + 1,\ x = 0,\ y = 0,\ y = 1$



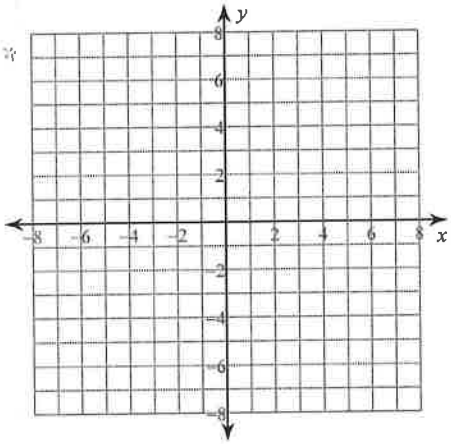
4) $x = -y^2 + 6,\ x = 2,\ y = 0,\ y = 2$



5) $x = -y^2 + 6,\ x = 2$

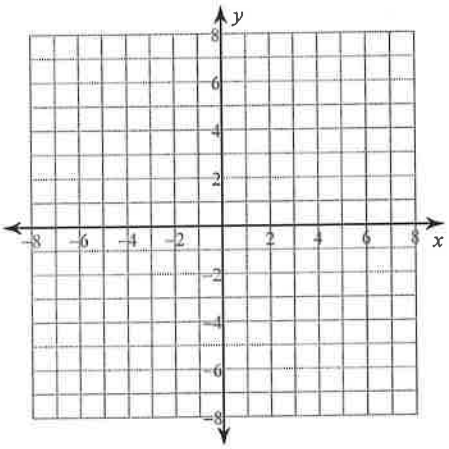


6) $x = \sqrt{y} + 1,\ x = 1,\ y = 4$

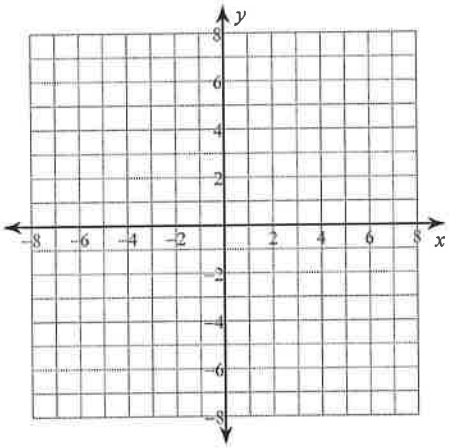


For each problem, find the volume of the solid that results when the region enclosed by the curves is revolved about the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

7) $y = x^2 + 3,\ y = 2,\ x = 0,\ x = 2$
Axis: $y = 1$



8) $y = 2x - 1,\ y = x^2 - 1$
Axis: $y = -1$



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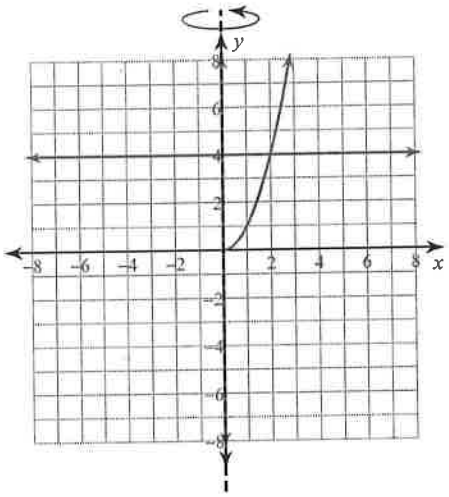
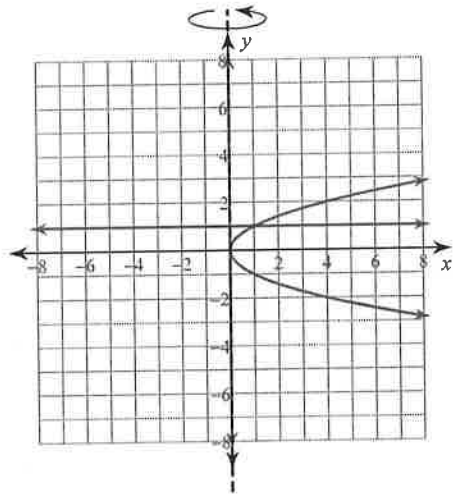
1) $x = \sqrt{y},\ x = 0,\ y = 4$



$$\pi \int_0^4 \left(\sqrt{y}\right)^2 dy$$

$$= 8\pi \approx 25.133$$

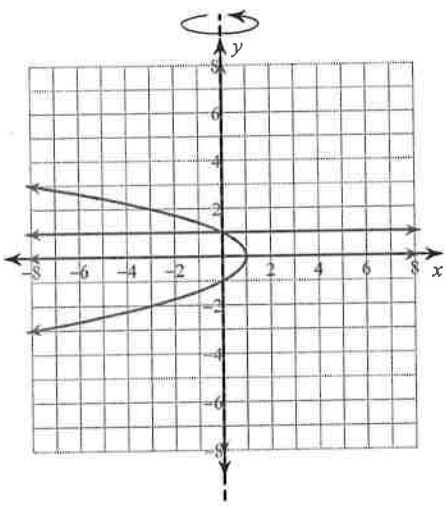
2) $x = y^2,\ x = 0,\ y = 1$



$$\pi \int_0^1 \left(y^2\right)^2 dy$$

$$= \frac{1}{5}\pi \approx 0.628$$

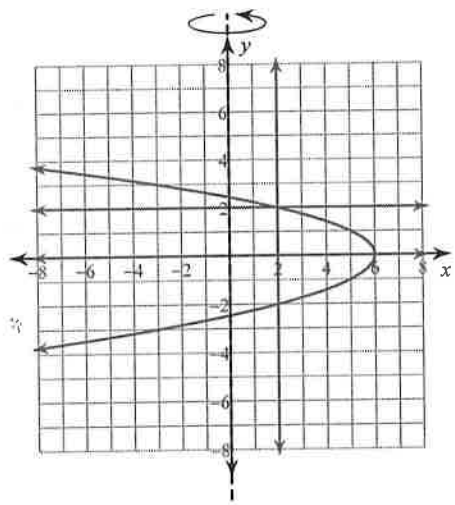
3) $x = -y^2 + 1,\ x = 0,\ y = 0,\ y = 1$



$$\pi \int_0^1 \left(-y^2 + 1\right)^2 dy$$

$$= \frac{8}{15}\pi \approx 1.676$$

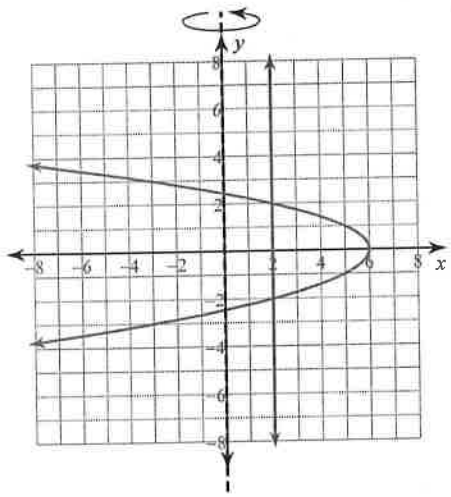
4) $x = -y^2 + 6,\ x = 2,\ y = 0,\ y = 2$



$$\pi \int_0^2 \left(\left(-y^2 + 6\right)^2 - 2^2\right) dy$$

$$= \frac{192}{5}\pi \approx 120.637$$

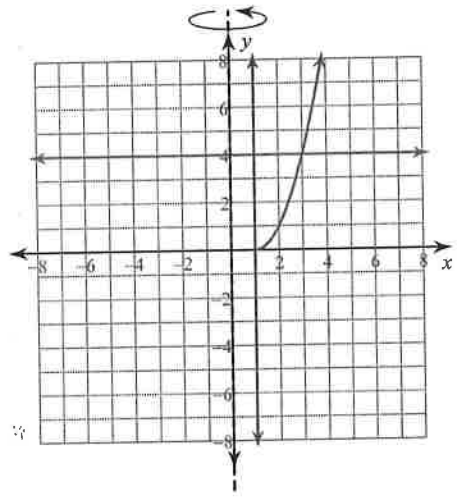
5) $x = -y^2 + 6,\ x = 2$



$$\pi\int_{-2}^{2}\left(\left(-y^2+6\right)^2 - 2^2\right)dy$$

$$= \frac{384}{5}\pi \approx 241.274$$

6) $x = \sqrt{y} + 1,\ x = 1,\ y = 4$

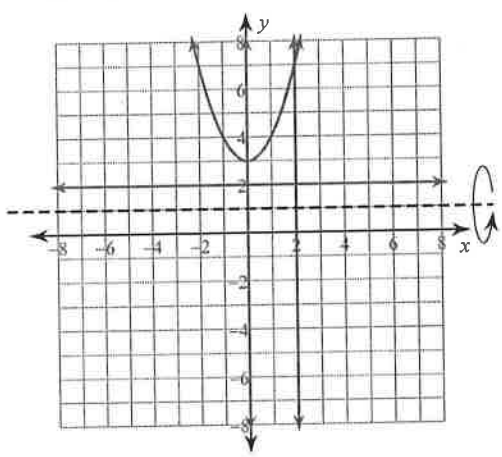


$$\pi\int_{0}^{4}\left(\left(\sqrt{y}+1\right)^2 - 1\right)dy$$

$$= \frac{56}{3}\pi \approx 58.643$$

For each problem, find the volume of the solid that results when the region enclosed by the curves is revolved about the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

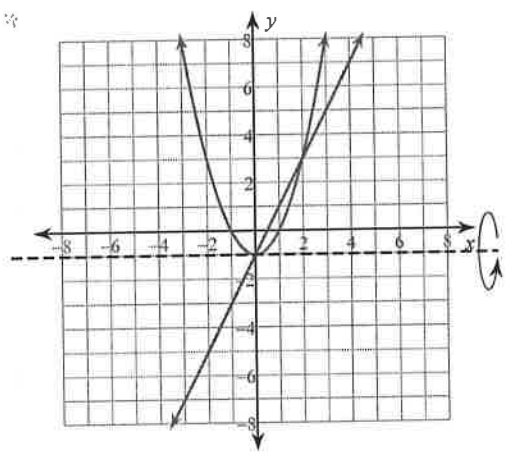
7) $y = x^2 + 3,\ y = 2,\ x = 0,\ x = 2$
Axis: $y = 1$



$$\pi\int_{0}^{2}\left(\left(x^2+2\right)^2 - 1\right)dx$$

$$= \frac{346}{15}\pi \approx 72.466$$

8) $y = 2x - 1,\ y = x^2 - 1$
Axis: $y = -1$



$$\pi\int_{0}^{2}\left((2x)^2 - \left(x^2\right)^2\right)dx$$

$$= \frac{64}{15}\pi \approx 13.404$$