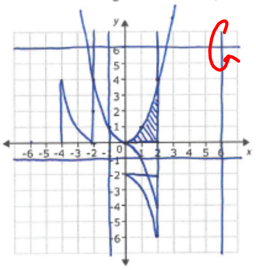
1. Sketch the region bounded by the curve $y = x^2$, the x-axis, and the line $x = 2$.



2. Determine the area of the region.

$$\int_0^2 x^2\,dx = \frac{1}{3}x^3\Big|_0^2 = \boxed{\frac{8}{3}}$$

3. Write, but do not evaluate, an integral that would determine the length of the curve $y = x^2$ on the interval [0,2].

$y' = 2x$

$$\int_0^2 \sqrt{1+(2x)^2}\,dx$$

4. Write, but do not evaluate, an integral that would determine the surface area of the solid obtained by revolving the surface described in #1 about the x-axis.

$$\int_0^2 2\pi\,(x^2)\sqrt{1+(2x)^2}\,dx$$

5. About $y = 0$

$$\int_0^2 \pi\,(x^2)^2\,dx$$

6. About $x = 0$

$$\pi\,(2)^2\cdot 4 - \int_0^4 \pi\,(\sqrt{y})^2\,dy$$

7. About $y = 6$

$$\pi\,(6)^2\cdot 2 - \int_0^2 \pi\,(6-x^2)^2\,dx$$

8. About $x = 6$

$$\int_0^4 \pi\,(6-\sqrt{y})^2\,dy - \pi\,(4)^2\cdot 4$$

9. About $y = -1$

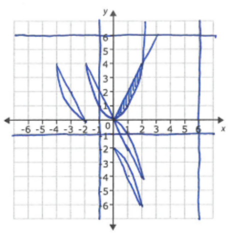
$$\int_0^2 \pi\,(x^2-(-1))^2\,dx - \pi\,(1)^2\cdot 2$$

10. About $x = -1$

$$\pi\,(3)^2\cdot 4 - \int_0^4 \pi\,(\sqrt{y}-(-1))^2\,dy$$

11. Sketch the region bounded by the curves $y = x^2$ and $y = 2x$.

$\sqrt{y} = x$ $\quad \frac{y}{2} = x$



12. Determine the area of the region.

$$\int_0^2 (2x - x^2)\,dx = x^2 - \frac{1}{3}x^3\Big|_0^2 = 2^2 - \frac{8}{3} = \frac{12}{3} - \frac{8}{3} = \boxed{\frac{4}{3}}$$

13. About $y = 0$ $\quad \int_0^2 \pi\,(2x)^2\,dx - \int_0^2 \pi (x^2)^2\,dx \quad$ OR $\quad \frac{\pi}{3}(4)^2\cdot 2 - \int_0^2 \pi (x^2)^2\,dx$

14. About $x = 0$ $\quad \int_0^4 \pi\,(\sqrt{y})^2\,dy - \int_0^4 \pi\left(\frac{y}{2}\right)^2 dy \quad$ OR $\quad \int_0^4 \pi(\sqrt{y})^2\,dy - \frac{\pi}{3}(2)^2\cdot 4$

15. About $y = 6$ $\quad \int_0^2 \pi\,(6-x^2)^2\,dx - \int_0^2 \pi\,(6-2x)^2\,dx$

16. About $x = 6$ $\quad \int_0^4 \pi\,\left(6-\frac{y}{2}\right)^2 dy - \int_0^4 \pi\,(6-\sqrt{y})^2\,dy$

17. About $y = -1$ $\quad \int_0^2 \pi\,(2x-(-1))^2\,dx - \int_0^2 \pi\,(x^2-(-1))^2\,dx$

18. About $x = -1$

$$\underbrace{\int_0^4 \pi\,(\sqrt{y}-(-1))^2\,dy - \int_0^4 \pi\left(\frac{y}{2}-(-1)\right)^2 dy}_{\pi\int_0^4 \left[(\sqrt{y}+1)^2 - \left(\frac{y}{2}+1\right)^2\right] dy}$$