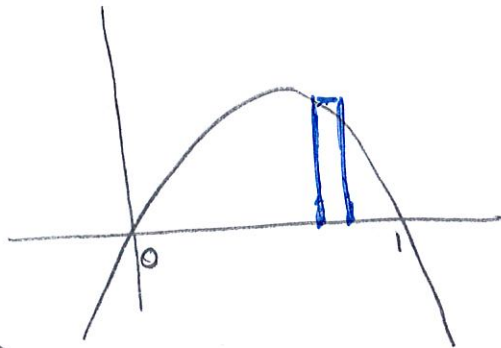


Warm Up

- ① Find the volume of the solid generated by revolving $y = x - x^2$ bounded by $y = 0$ over the x -axis,



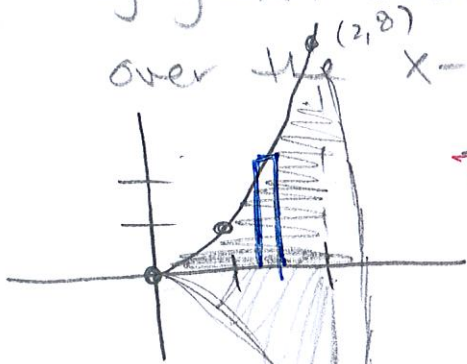
$$r = x - x^2$$

$$A = \pi r^2 = \pi (x - x^2)^2 = \pi (x^2 - 2x^3 + x^4)$$

$$\pi \int_0^1 x^2 - 2x^3 + x^4$$

$$\pi \left[\frac{1}{3}x^3 - \frac{1}{2}x^4 + \frac{1}{5}x^5 \right]_0^1 = \frac{\pi}{30}$$

- ② Find the volume of the solid generated by $y = x^3$ bounded by $y = 0$, $x = 2$ over the x -axis.

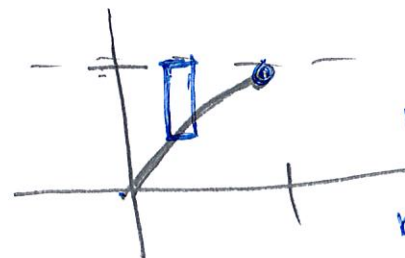
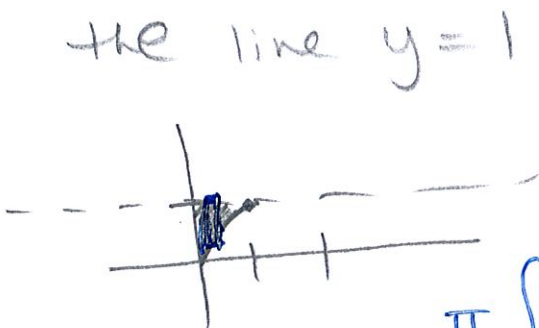


$$A = \pi r^2 = \pi (x^3)^2 = \pi x^6$$

$$\pi \int_0^2 x^6 dx = \pi \left[\frac{1}{7}x^7 \right]_0^2$$

$$= \frac{128\pi}{7}$$

- ③ Find the volume of the solid generated by $y = \sqrt{x}$ bounded by $y = 1$, $x = 0$ over the line $y = 1$.



$$r = 1 - \sqrt{x}$$

$$r^2 = (1 - \sqrt{x})^2$$

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

$$\pi \int_0^1 1 - 2\sqrt{x} + x dx$$

$$\pi \left[x - \frac{4}{3}x^{3/2} + \frac{1}{2}x^2 \right]_0^1 = \frac{\pi}{6}$$