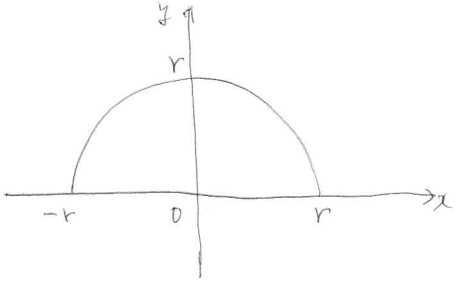
§1.3.4

問題A



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

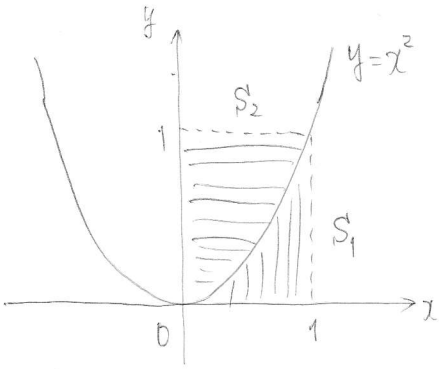
(2)

(3) $$\int_{-r}^{r} \pi y^2 dx = \int_{-r}^{r} \pi (r^2 - x^2) dx$$

$$= 2\int_{0}^{r} \pi (r^2 - x^2) dx = 2\pi \left[r^2 x - \frac{x^3}{3} \right]_0^r = 2\pi \left(r^3 - \frac{r^3}{3} \right) = \frac{\pi r^3}{3}$$

問題B

II (1)



(2) $$S_1 = \int_0^1 x^2 dx = \frac{x^3}{3}\Big|_0^1 = \frac{1}{3}$$

(3) $$V_1 = \int_0^1 \pi (x^2)^2 dx = \pi \int_0^1 x^4 dx = \pi \left[\frac{x^5}{5} \right]_0^1 = \frac{\pi}{5}$$

(4) $$S_2 = \int_0^1 x\, dy = \int_0^1 \sqrt{y}\, dy = 1 - S_1 = \frac{2}{3}$$

(5) $$V_2 = \int_0^1 \pi x^2 dy = \pi \int_0^1 y\, dy = \pi \left[\frac{y^2}{2} \right]_0^1 = \frac{\pi}{2}$$