

IV

$$f(x) = \frac{\sin x}{3 - 2\cos x} \quad (0 \leq x \leq \pi)$$

(1). $f(x)$ の導関数

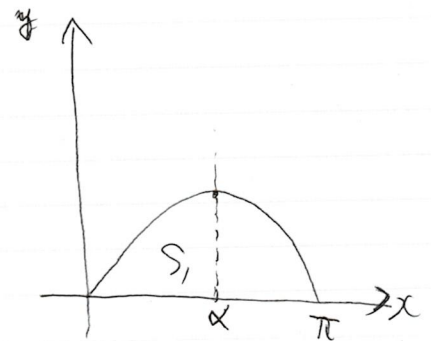
$$\begin{aligned} f'(x) &= \frac{\cos x (3 - 2\cos x) - \sin x (-2\sin x)}{(3 - 2\cos x)^2} = \frac{3\cos x - 2\cos^2 x - 2\sin^2 x}{(3 - 2\cos x)^2} \\ &= \frac{3\cos x - 2}{(3 - 2\cos x)^2} \end{aligned}$$

$$\text{よ} \quad f'(x) = 0 \quad \text{のとき} \quad \cos x = \frac{2}{3}$$

(2).

$$\begin{aligned} S_1 &= \int_0^{\alpha} f(x) dx \\ &= \int_0^{\alpha} \frac{\sin x}{3 - 2\cos x} dx \quad \cos x = t \quad \text{と} \quad t < x, \end{aligned}$$

$$\begin{aligned} -\sin x dx &= dt, & x: 0 \rightarrow \alpha \\ t &: 1 \rightarrow \frac{2}{3} \end{aligned}$$



$$\begin{aligned} \text{よ} \quad S_1 &= \int_1^{\frac{2}{3}} \frac{-dt}{3-2t} = \int_{\frac{2}{3}}^1 \frac{dt}{3-2t} = \left[-\frac{1}{2} \log(3-2t) \right]_{\frac{2}{3}}^1 \\ &= -\frac{1}{2} \left\{ \log 1 - \log \frac{5}{3} \right\} = \frac{1}{2} \log \frac{5}{3} \end{aligned}$$

$$\begin{aligned} \text{よ} \quad S_2 &= \int_{\alpha}^{\pi} f(x) dx = \int_{\frac{2}{3}}^{-1} \frac{dt}{3-2t} = \int_{-1}^{\frac{2}{3}} \frac{dt}{3-2t} = \left[-\frac{1}{2} \log(3-2t) \right]_{-1}^{\frac{2}{3}} \\ &= -\frac{1}{2} \left\{ \log \frac{5}{3} - \log 5 \right\} = -\frac{1}{2} \log \frac{1}{3} = \frac{1}{2} \log 3 \end{aligned}$$