

□

□

cosθ

$$= 4\cos^3\theta - 3\cos\theta$$

$$\Leftrightarrow \cos^3\theta = \frac{1}{4}\cos^3\theta + \frac{3}{4}\cos\theta$$

$$U_n = e^{B_n S_n}$$

$$= S_n$$

$$U_1 + \dots + U_{2^n}$$

$$= \delta \left[1 + \frac{1}{4} \cos \frac{\pi}{6} + \frac{3}{4} \cos \frac{\pi}{18} \right]^{\frac{1}{2}}$$

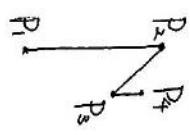
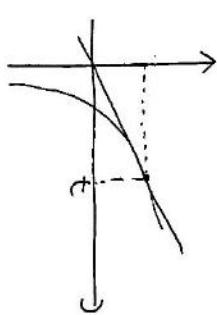
$$- \frac{3}{2} (1 + \cos \frac{\pi}{6})^2$$

$$= 4(1 + \frac{\sqrt{3}}{2} + \frac{3}{4} \cos \frac{\pi}{18})$$

$$- 3(1 + \cos \frac{\pi}{18})$$

$$= 1 + \frac{\sqrt{3}}{2}$$

[2]

P₁P₂P₃P₄P₅P₆P₇P₈P₉P₁₀P₁₁P₁₂P₁₃P₁₄P₁₅P₁₆P₁₇P₁₈P₁₉P₂₀P₂₁P₂₂P₂₃P₂₄P₂₅P₂₆P₂₇P₂₈P₂₉P₃₀P₃₁P₃₂P₃₃P₃₄P₃₅P₃₆P₃₇P₃₈P₃₉P₄₀P₄₁P₄₂P₄₃P₄₄P₄₅P₄₆P₄₇P₄₈P₄₉P₅₀P₅₁P₅₂P₅₃P₅₄P₅₅P₅₆P₅₇P₅₈P₅₉P₆₀P₆₁P₆₂P₆₃P₆₄P₆₅P₆₆P₆₇P₆₈P₆₉P₇₀P₇₁P₇₂P₇₃P₇₄P₇₅P₇₆P₇₇P₇₈P₇₉P₈₀P₈₁P₈₂P₈₃P₈₄P₈₅P₈₆P₈₇P₈₈P₈₉P₉₀P₉₁P₉₂P₉₃P₉₄P₉₅P₉₆P₉₇P₉₈P₉₉P₁₀₀P₁₀₁P₁₀₂P₁₀₃P₁₀₄P₁₀₅P₁₀₆P₁₀₇P₁₀₈P₁₀₉P₁₁₀P₁₁₁P₁₁₂P₁₁₃P₁₁₄P₁₁₅P₁₁₆P₁₁₇P₁₁₈P₁₁₉P₁₂₀P₁₂₁P₁₂₂P₁₂₃P₁₂₄P₁₂₅P₁₂₆P₁₂₇P₁₂₈P₁₂₉P₁₃₀P₁₃₁P₁₃₂P₁₃₃P₁₃₄P₁₃₅P₁₃₆P₁₃₇P₁₃₈P₁₃₉P₁₄₀P₁₄₁P₁₄₂P₁₄₃P₁₄₄P₁₄₅P₁₄₆P₁₄₇P₁₄₈P₁₄₉P₁₅₀P₁₅₁P₁₅₂P₁₅₃P₁₅₄P₁₅₅P₁₅₆P₁₅₇P₁₅₈P₁₅₉P₁₆₀P₁₆₁P₁₆₂P₁₆₃P₁₆₄P₁₆₅P₁₆₆P₁₆₇P₁₆₈P₁₆₉P₁₇₀P₁₇₁P₁₇₂P₁₇₃P₁₇₄P₁₇₅P₁₇₆P₁₇₇P₁₇₈P₁₇₉P₁₈₀P₁₈₁P₁₈₂P₁₈₃P₁₈₄P₁₈₅P₁₈₆P₁₈₇P₁₈₈P₁₈₉P₁₉₀P₁₉₁P₁₉₂P₁₉₃P₁₉₄P₁₉₅P₁₉₆P₁₉₇P₁₉₈P₁₉₉P₂₀₀P₂₀₁P₂₀₂P₂₀₃P₂₀₄P₂₀₅P₂₀₆P₂₀₇P₂₀₈P₂₀₉P₂₁₀P₂₁₁P₂₁₂P₂₁₃P₂₁₄P₂₁₅P₂₁₆P₂₁₇P₂₁₈P₂₁₉P₂₂₀P₂₂₁P₂₂₂P₂₂₃P₂₂₄P₂₂₅P₂₂₆P₂₂₇P₂₂₈P₂₂₉P₂₃₀P₂₃₁P₂₃₂P₂₃₃P₂₃₄P₂₃₅P₂₃₆P₂₃₇P₂₃₈P₂₃₉P₂₄₀P₂₄₁P₂₄₂P₂₄₃P₂₄₄P₂₄₅P₂₄₆P₂₄₇P₂₄₈P₂₄₉P₂₅₀P₂₅₁P₂₅₂P₂₅₃P₂₅₄P₂₅₅P₂₅₆P₂₅₇P₂₅₈P₂₅₉

P

[3]

$$\sin\theta = \frac{a - r_2}{a + r_2}$$

$$(t^2\cos\theta - 1)^2 + \cos^2\theta = 1$$

$$\begin{aligned} & \Leftrightarrow ((t\sin\theta) + 1)(t\cos\theta - t) = 0 \\ & \Rightarrow t\cos\theta = t \end{aligned}$$

$$\begin{aligned} & \Rightarrow \cos\theta = \frac{t}{t+1} \\ & = \frac{t}{2t+1} e^{-\sqrt{t}} \\ & = \frac{2-\sqrt{t}}{2t} e^{-\sqrt{t}} \end{aligned}$$

$$\begin{aligned} & \therefore L = AB + BC + CA \\ & = AB + 2AB\sin\theta + AB \\ & = 2AB(1 + \sin\theta) \end{aligned}$$

$$\begin{aligned} & \Leftrightarrow AB = \frac{L}{2(1 + \sin\theta)} \\ & \text{また} \end{aligned}$$

$$\Delta ABC = \frac{a}{2}(AB + BC + CA)$$

$$\begin{aligned} & \Rightarrow \frac{1}{2}AB^2\sin\theta = \frac{aL}{2} \\ & \Rightarrow \frac{L^2}{4(1 + \sin\theta)^2}\sin\theta = aL \end{aligned}$$

$$\begin{aligned} & \Leftrightarrow L\sin\theta = 4a(1 + \sin\theta)^2 \\ & \therefore L = \frac{20(1 + \sin\theta)^2}{\sin\theta\cos\theta} \end{aligned}$$

[4]

$$\begin{aligned} & \sin\theta = \frac{2\sqrt{t}}{t^2+4} - 1 = \frac{t^2-4}{t^2+4} \\ & x = 4\sqrt{t} \quad t \in [0, \infty) \quad e^{-x} = \frac{1}{t^2+4} \end{aligned}$$

$$y = \frac{2\sqrt{t}}{t^2+4} e^{t^2} (x-t) + (\sqrt{t}-1) e^{t^2}$$

$$0 = \frac{2-\sqrt{t}}{2} e^{t^2} (-t) + (\sqrt{t}-1) e^{t^2}$$

$$\Leftrightarrow 0 = t - 2\sqrt{t} + 2\sqrt{t} - 2$$

$$\therefore t = 2$$

$$(原点) = \frac{\sqrt{2}-1}{2} e^{\sqrt{2}}$$

$$[2] \quad L = \pi$$

$$= \frac{2(1 + \sin\theta)^2}{\cos\theta} = \pi$$

$$\Leftrightarrow 2 + 2\sin\theta = \pi\cos\theta$$

$$\Leftrightarrow \sin\theta = \frac{\pi}{2}\cos\theta - 1$$

円周の半径を r_n とおく。

[5]

$$\sin^2\theta + \cos^2\theta = 1 \quad (5)$$

$$f(x) = \frac{1}{2}x^{\frac{1}{2}}e^{-\sqrt{x}}$$

$$+ (\sqrt{x}-1)(-\frac{1}{2}x^{-\frac{1}{2}})e^{-\sqrt{x}}$$

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

$$= \frac{2-\sqrt{x}}{2\sqrt{x}} e^{-\sqrt{x}}$$

$$\Leftrightarrow r_2 = \frac{1 - \sin\theta}{1 + \sin\theta} a$$

$$\therefore \cos\theta = \frac{r_2}{r_2 + 1}$$

$$\Leftrightarrow AB = \frac{L}{2(r_2 + 1)}$$

また

$$\Delta ABC = \frac{a}{2}(AB + BC + CA)$$

$$\Rightarrow \frac{L^2}{4(1 + \sin\theta)^2}\sin\theta = aL$$

$$= \frac{L^2}{2\pi^2} 2r_n \pi$$

$$\Rightarrow L\sin\theta = 4a(1 + \sin\theta)^2$$

$$\therefore L = \frac{20(1 + \sin\theta)^2}{\sin\theta\cos\theta}$$

$$\Leftrightarrow L = \frac{20(1 + \sin\theta)^2}{\sin\theta\cos\theta}$$

$$[2] \quad L = \pi$$

$$= \frac{2(1 + \sin\theta)^2}{\cos\theta} = \pi$$

$$\Leftrightarrow 2 + 2\sin\theta = \pi\cos\theta$$

$$\Leftrightarrow \sin\theta = \frac{\pi}{2}\cos\theta - 1$$

$$\Leftrightarrow \sin\theta = \frac{\pi}{2}\cos\theta - 1$$

$$\pi r_n \cdot \frac{\pi}{2}r_n = \pi r_n^2$$

$$\int_0^{\pi} \int_0^{\pi} t^2 e^{t^2} dt$$

$$= \int_0^{\pi} \left[-t^2 e^{-t} - 2t e^{-t} - 2e^{-t} \right]_0^{\pi}$$

$$= \int_0^{\pi} \left[\frac{t^2 e^{-t} - 2t e^{-t} + 2e^{-t} - 2e^{-\pi}}{t^2 - 2t + 2} \right]_0^{\pi}$$

$$= -(\pi^2 - 2\pi + 2)e^{-\pi} + 2$$

$$= \frac{(3\pi + 5)e^{-\pi}}{2}$$