

ショートトライアル 三角関数 1

____組____番 氏名_____

[1] 次のような扇形と弧の長さ ℓ と面積 S を求めよ。

$$(1) \text{ 半径が } 4, \text{ 中心角が } \frac{\pi}{5}$$

$$(2) \text{ 半径が } 6, \text{ 中心角が } \frac{2}{3}\pi$$

[2] 次の値を求めよ。

$$(1) \sin\left(-\frac{4}{3}\pi\right)$$

$$(2) \cos\frac{17}{4}\pi$$

$$(3) \tan\frac{11}{6}\pi$$

[3] 関数 $y = \sin\left(\theta - \frac{\pi}{3}\right)$ のグラフをかけ。

[4] $\sin\theta - \cos\theta = a$ のとき、次の式の値を a を用いて表せ。

$$(1) \sin\theta \cos\theta$$

$$(2) \sin^3\theta - \cos^3\theta$$

ショートトライアル 三角関数 1

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1 次のような扇形と弧の長さ ℓ と面積 S を求めよ。

$$(1) \text{ 半径が } 4, \text{ 中心角が } \frac{\pi}{5}$$

$$\ell = 4 \times \frac{\pi}{5} = \frac{4}{5}\pi //$$

$$S = \frac{1}{2} \cdot \frac{4}{5}\pi \cdot 4 = \frac{8}{5}\pi //$$



$$\ell = r\theta$$

$$S = \frac{1}{2} \ell r$$

$$(2) \text{ 半径が } 6, \text{ 中心角が } \frac{2}{3}\pi$$

$$\ell = 6 \times \frac{2}{3}\pi = 4\pi //$$

$$S = \frac{1}{2} \cdot 4\pi \cdot 6 = 12\pi //$$

2 次の値を求めよ。

$$(1) \sin\left(-\frac{4}{3}\pi\right)$$

$$(\text{式}) = -\sin\frac{4}{3}\pi = -\left(-\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{2} //$$

$$(\text{別解}) (\text{式}) = \sin\frac{2}{3}\pi = \frac{\sqrt{3}}{2} //$$

$$(2) \cos\frac{17}{4}\pi$$

$$(\text{式}) = \cos\left(\frac{\pi}{4} + 4\pi\right) = \cos\frac{\pi}{4} = \frac{1}{\sqrt{2}} //$$

$$(3) \tan\frac{11}{6}\pi$$

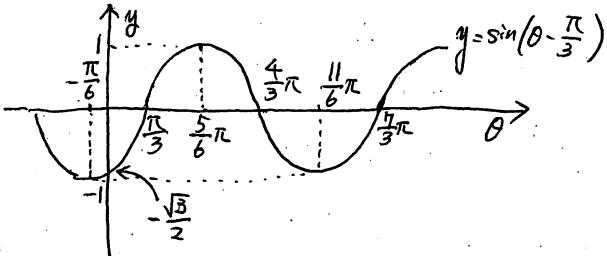
$$(\text{式}) = -\frac{1}{\sqrt{3}} //$$

3 関数 $y = \sin\left(\theta - \frac{\pi}{3}\right)$ のグラフをかけ。 $(y = \sin\theta \text{ は } \theta \text{ 軸} \rightarrow \frac{\pi}{3})$

$$\text{周期 } 2\pi, y \text{ が } 0 \text{ のとき } y = \sin\left(0 - \frac{\pi}{3}\right) = -\sin\frac{\pi}{3} = -\frac{\sqrt{3}}{2}$$

下書き

$$\begin{aligned} \frac{\pi}{3} - \frac{\pi}{2} &= -\frac{\pi}{6} \\ \frac{\pi}{3} + \frac{\pi}{2} &= \frac{5}{6}\pi \\ \frac{4}{3}\pi + \frac{\pi}{2} &= \frac{11}{6}\pi \end{aligned}$$



4 $\sin\theta - \cos\theta = a$ のとき、次の式の値を a を用いて表せ。

$$(1) \sin\theta \cos\theta$$

$$\sin\theta - \cos\theta = a \text{ の两边に } 2 \text{乗して}$$

$$(\sin\theta - \cos\theta)^2 = a^2$$

$$\sin^2\theta - 2\sin\theta \cos\theta + \cos^2\theta = a^2$$

$$1 - 2\sin\theta \cos\theta = a^2$$

$$\therefore \sin\theta \cos\theta = \frac{-a^2 + 1}{2} //$$

$$(2) \sin^3\theta - \cos^3\theta$$

$$(\text{式}) = (\sin\theta - \cos\theta)(\sin^2\theta + \sin\theta \cos\theta + \cos^2\theta)$$

$$= a \cdot \left(1 + \frac{-a^2 + 1}{2}\right)$$

$$= \frac{a(-a^2 + 3)}{2} //$$

ショートトライアル 三角関数 2

____組____番 氏名 _____

[1] 次の関数のグラフをかけ。また、その周期をいえ。

$$(1) y = \cos 3\theta$$

[2] $0 \leq \theta < 2\pi$ のとき、次の方程式を解け。

$$(1) \cos \theta = \frac{1}{2}$$

$$(2) \tan \theta = -\sqrt{3}$$

$$(2) y = \sin \left(\theta - \frac{\pi}{4} \right)$$

[3] 次の値を求めよ。

$$(1) \cos \left(-\frac{13}{6}\pi \right)$$

$$(3) y = 2 \sin \frac{\theta}{2}$$

$$(2) \tan \frac{7}{3}\pi$$

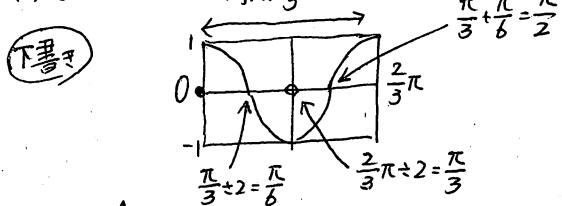
$$(3) \sin \frac{9}{2}\pi$$

ショートトライアル 三角関数 2

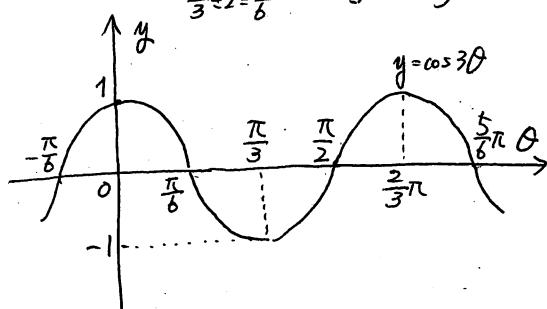
____組____番 氏名 _____

- 1 次の関数のグラフをかけ。また、その周期をいえ。

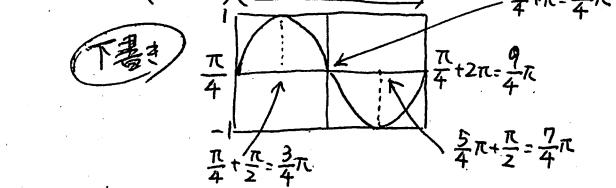
(1) $y = \cos 3\theta$



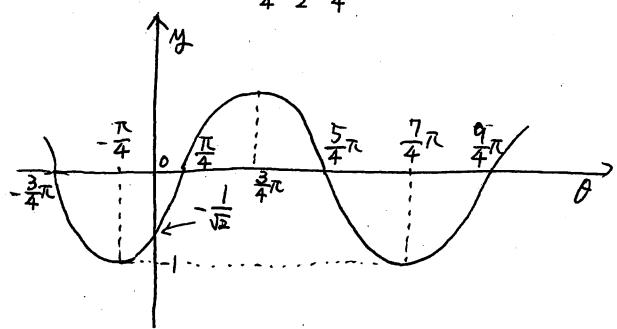
下書き



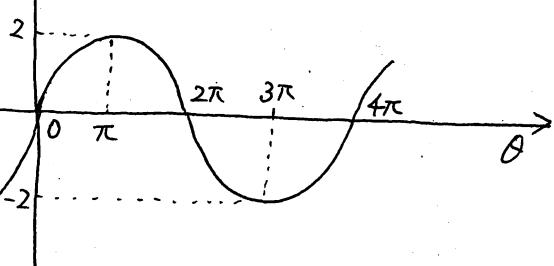
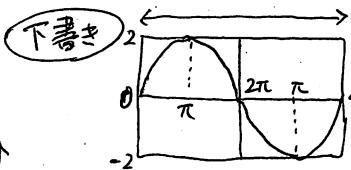
(2) $y = \sin\left(\theta - \frac{\pi}{4}\right)$ 周期 2π



下書き



(3) $y = 2 \sin \frac{\theta}{2}$ 周期 $\frac{2\pi}{\frac{1}{2}} = 4\pi$

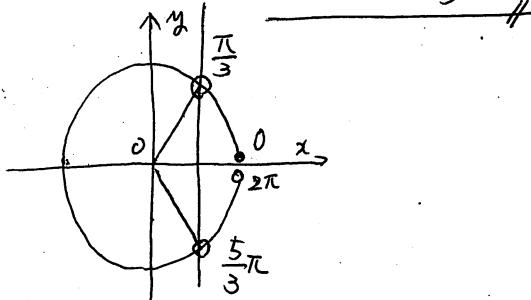


公式 $y = \sin k\theta, y = \cos k\theta$ の周期は $\frac{2\pi}{k}$
 $y = \tan k\theta$ の周期は $\frac{\pi}{k}$

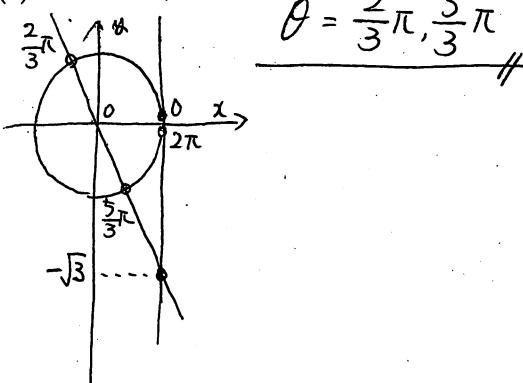
- 2 $0 \leq \theta < 2\pi$ のとき、次の方程式を解け。

(1) $\cos \theta = \frac{1}{2}$

$\theta = \frac{\pi}{3}, \frac{5}{3}\pi$



(2) $\tan \theta = -\sqrt{3}$



- 3 次の値を求めよ。

$\sin(-\theta) = -\sin\theta$

$\cos(-\theta) = \cos\theta$

$\tan(-\theta) = -\tan\theta$

(1) $\cos\left(-\frac{13}{6}\pi\right)$

(5式) $= \cos\frac{13}{6}\pi = \cos\left(\frac{\pi}{6} + 2\pi\right)$
 $= \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

(2) $\tan\frac{7}{3}\pi$

(5式) $= \tan\left(\frac{\pi}{3} + 2\pi\right) = \tan\frac{\pi}{3} = \sqrt{3}$

(3) $\sin\frac{9}{2}\pi$

(5式) $= \sin\left(\frac{\pi}{2} + 4\pi\right) = \sin\frac{\pi}{2} = 1$

ショートトライアル 三角関数 3

____組____番 氏名_____

[1] $0 \leq \theta < 2\pi$ のとき、次の方程式・不等式を解け。

$$(1) 2 \sin \theta + 1 = 0$$

$$(2) \tan \theta > 1$$

[2] 次の値を求めよ。

$$(1) \sin\left(-\frac{17}{3}\pi\right)$$

$$(2) \cos 105^\circ$$

[3] 次の関数のグラフをかけ。また、その周期をいえ。

$$(1) y = \cos\left(\theta + \frac{\pi}{6}\right)$$

$$(3) \sin\left(\theta + \frac{\pi}{3}\right) = \frac{1}{\sqrt{2}}$$

$$(2) y = \sin\left(\frac{\theta}{2} - \frac{\pi}{4}\right)$$

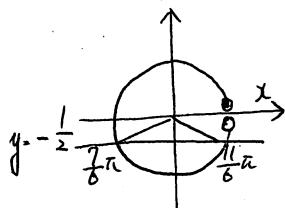
ショートトライアル 三角関数 3

組 番 氏名 _____

[1] $0 \leq \theta < 2\pi$ のとき、次の方程式・不等式を解け。

$$(1) 2\sin\theta + 1 = 0$$

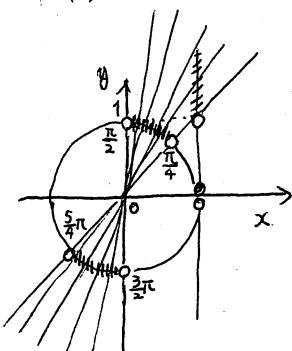
$$\sin\theta = -\frac{1}{2}$$



$0 \leq \theta < 2\pi$ より

$$\theta = \frac{7}{6}\pi, \frac{11}{6}\pi$$

$$(2) \tan\theta > 1$$



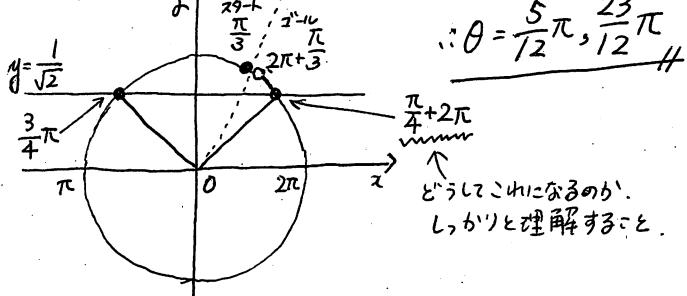
$0 \leq \theta < 2\pi$ より

$$\frac{\pi}{4} < \theta < \frac{\pi}{2}, \frac{5}{4}\pi < \theta < \frac{3}{2}\pi$$

$$(3) \sin\left(\theta + \frac{\pi}{3}\right) = \frac{1}{\sqrt{2}} \quad \text{（重要!!）}$$

$0 \leq \theta < 2\pi$ より

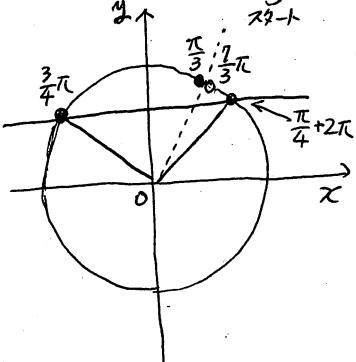
$$\frac{\pi}{3} \leq \theta + \frac{\pi}{3} < 2\pi + \frac{\pi}{3} \quad \text{たゞか;} \quad \theta + \frac{\pi}{3} = \frac{3}{4}\pi, \frac{\pi}{4} + 2\pi$$



$$(\text{別解}) \theta + \frac{\pi}{3} = t \text{ とおくと } \sin t = \frac{1}{\sqrt{2}} \cdots ①$$

$$0 \leq \theta < 2\pi \text{ より } 0 + \frac{\pi}{3} \leq \theta + \frac{\pi}{3} < 2\pi + \frac{\pi}{3}$$

$$\therefore \frac{\pi}{3} \leq t < \frac{7}{3}\pi \cdots ②$$



②の範囲で①を解く

$$t = \frac{3}{4}\pi, \frac{\pi}{4} + 2\pi$$

$$\theta + \frac{\pi}{3} = \frac{3}{4}\pi, \frac{9}{4}\pi$$

$$\therefore \theta = \frac{5}{12}\pi, \frac{23}{12}\pi$$

[2] 次の値を求めよ。

$$(1) \sin\left(-\frac{17}{3}\pi\right)$$

$$(\text{式}) = -\sin\frac{17}{3}\pi = -\sin\left(\frac{5}{3}\pi + 4\pi\right)$$

$$= -\sin\frac{5}{3}\pi = -\left(-\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{2}$$

$$(\text{別解}) (\text{式}) = \sin\left(\frac{\pi}{3} - 6\pi\right) = \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

$$(2) \cos 105^\circ$$

$$(\text{式}) = \cos(60^\circ + 45^\circ)$$

$$= \cos 60^\circ \cos 45^\circ - \sin 60^\circ \sin 45^\circ$$

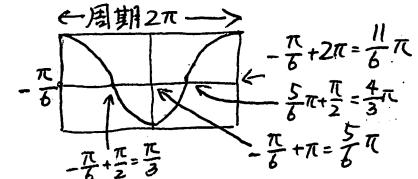
$$= \frac{1}{2} \cdot \frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}} = \frac{1-\sqrt{3}}{2\sqrt{2}}$$

$$= \frac{\sqrt{2}-\sqrt{6}}{4}$$

[3] 次の関数のグラフをかけ。また、その周期をいえ。

$$(1) y = \cos\left(\theta + \frac{\pi}{6}\right)$$

$$y \text{ の式} y = \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$$



周期 2π

$$-\frac{\pi}{6}, \frac{5}{6}\pi, \frac{11}{6}\pi$$

$$-\frac{\pi}{6} + 2\pi = \frac{11}{6}\pi$$

$$\frac{5}{6}\pi + \frac{\pi}{2} = \frac{4}{3}\pi$$

$$-\frac{\pi}{6} + \pi = \frac{5}{6}\pi$$

$$-\frac{\pi}{6}$$

$$-\frac{\pi}{6} + 2\pi = \frac{11}{6}\pi$$

$$\frac{5}{6}\pi + \pi = \frac{11}{6}\pi$$

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ショートトライアル 三角関数 4

____組____番 氏名 _____

1 0 ≤ x < 2π のとき、次の方程式・不等式を解け。

$$(1) \sqrt{2} \cos x + 1 > 0$$

$$(2) \sin x - \sqrt{3} \cos x = -1$$

2 次の値を求めよ。

$$(1) \cos\left(-\frac{11}{3}\pi\right)$$

$$(2) \tan\left(-\frac{15}{4}\pi\right)$$

3 $\frac{\pi}{2} < \alpha < \pi$ で、 $\cos \alpha = -\frac{4}{5}$ のとき、次の値を求めよ。

$$(1) \sin 2\alpha$$

$$(2) \cos 2\alpha$$

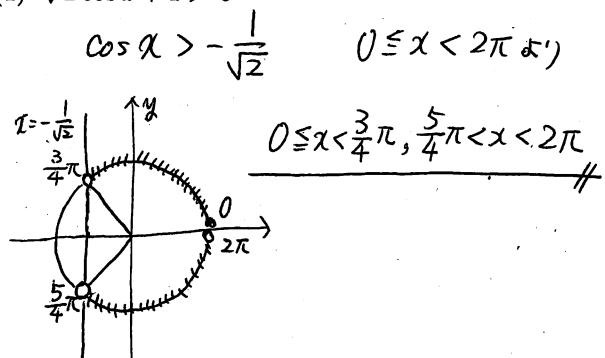
$$(3) \tan 2\alpha$$

ショートトライアル 三角関数 4

組 番 氏名 _____

1 $0 \leq x < 2\pi$ のとき、次の方程式・不等式を解け。

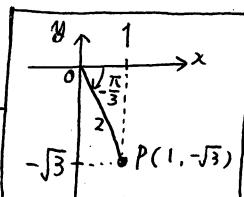
$$(1) \sqrt{2} \cos x + 1 > 0$$



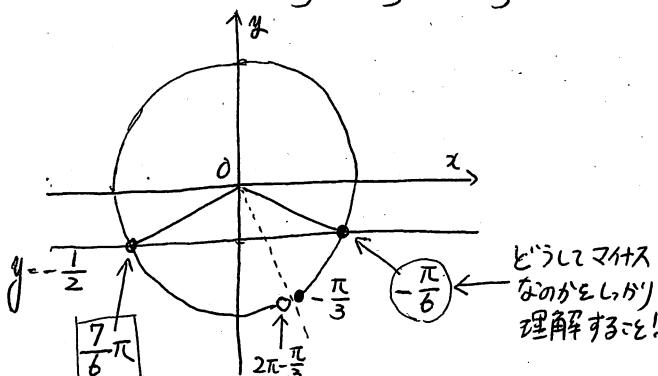
$$(2) \sin x - \sqrt{3} \cos x = -1$$

$$2 \sin(x - \frac{\pi}{3}) = -1$$

$$\sin(x - \frac{\pi}{3}) = -\frac{1}{2}$$



$$0 \leq x < 2\pi \text{ より } -\frac{\pi}{3} \leq x - \frac{\pi}{3} < 2\pi - \frac{\pi}{3} \text{ ただし}$$



$$\therefore \theta = \frac{\pi}{6}, \frac{3}{2}\pi$$

2 次の値を求めよ。

$$(1) \cos(-\frac{11}{3}\pi) \quad (\text{式}) = \cos \frac{11}{3}\pi = \cos(\frac{5}{3}\pi + 2\pi) \\ = \cos \frac{5}{3}\pi = \frac{1}{2}$$

$$(2) \tan(-\frac{15}{4}\pi) \quad (\text{式}) = -\tan \frac{15}{4}\pi = -\tan(\frac{7}{4}\pi + 2\pi) \\ = -\tan \frac{7}{4}\pi = -(-1) = 1$$

3 $\frac{\pi}{2} < \alpha < \pi$ で、 $\cos \alpha = -\frac{4}{5}$ のとき、次の値を求めよ。

$$(1) \sin 2\alpha$$

$$\frac{\pi}{2} < \alpha < \pi \text{ より } \sin \alpha > 0 \text{ だが} \\ \sin \alpha = \sqrt{1 - \cos^2 \alpha} = \sqrt{1 - (-\frac{4}{5})^2} = \frac{3}{5}$$

よって

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$= 2 \cdot \frac{3}{5} \cdot (-\frac{4}{5}) = -\frac{24}{25}$$

$$(2) \cos 2\alpha$$

$$\cos 2\alpha = 2 \cos^2 \alpha - 1 \\ = 2 \cdot (-\frac{4}{5})^2 - 1 \\ = \frac{7}{25}$$

$$(3) \tan 2\alpha$$

$$\tan 2\alpha = \frac{\sin 2\alpha}{\cos 2\alpha} \\ = \frac{-\frac{24}{25}}{\frac{7}{25}} \\ = -\frac{24}{7}$$

ショートトライアル 三角関数 5

____組____番 氏名_____

[1] 次の関数のグラフをかけ。また、その周期をいえ。

$$(1) \quad y = \tan\left(\theta - \frac{\pi}{3}\right)$$

[3] 2直線 $3x - y - 1 = 0$, $x - 2y + 2 = 0$ のなす
角 θ を求めよ。ただし、 $0 < \theta < \frac{\pi}{2}$ とする。

$$(2) \quad y = 2 \sin \frac{\theta}{3}$$

[4] $0 \leq x \leq \pi$ のとき、次の関数の最大値と最小値、
およびそのときの x の値を求めよ。

$$y = \sin x + \sqrt{3} \cos x$$

[2] 次の値を求めよ。

$$(1) \quad \tan\left(-\frac{29}{6}\pi\right)$$

$$(2) \quad \cos\left(-\frac{11}{4}\pi\right)$$

$$(3) \quad \cos 15^\circ$$

ショートトライアル 三角関数 5

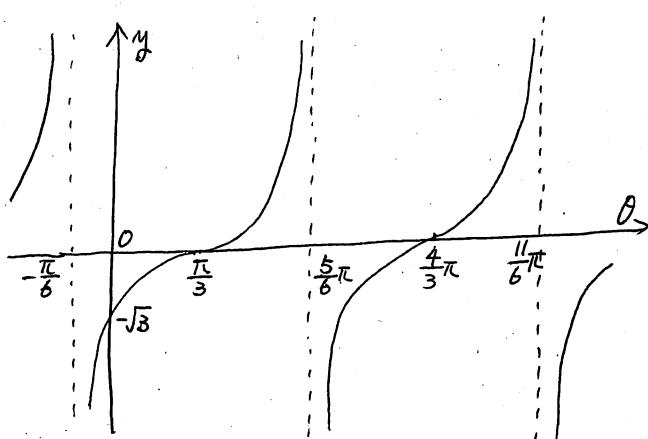
組 番 氏名 _____

1 次の関数のグラフをかけ。また、その周期をいえ。

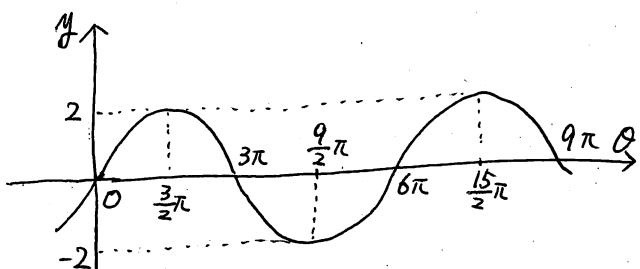
$$(1) y = \tan\left(\theta - \frac{\pi}{3}\right) \quad \text{周期 } \pi //$$

$y = \tan\theta$ を θ 軸方向へ $\frac{\pi}{3}$ だけ平行移動。

$$y = \tan\theta \text{ は } \theta = 0 \text{ のとき } y = \tan(-\frac{\pi}{3}) = -\tan\frac{\pi}{3} = -\sqrt{3}.$$



$$(2) y = 2 \sin \frac{\theta}{3} \quad \text{周期 } \frac{2\pi}{1/3} = 6\pi //$$



2 次の値を求めよ。

$$(1) \tan\left(-\frac{29}{6}\pi\right) \quad (\text{式}) = -\tan\frac{29}{6}\pi = -\tan\left(\frac{5}{6}\pi + 4\pi\right) \\ = -\tan\frac{5}{6}\pi = -\left(-\frac{1}{\sqrt{3}}\right) = \frac{1}{\sqrt{3}} //$$

$$(2) \cos\left(-\frac{11}{4}\pi\right) \quad (\text{式}) = \cos\frac{11}{4}\pi = \cos\left(\frac{3}{4}\pi + 2\pi\right) \\ = \cos\frac{3}{4}\pi = -\frac{1}{\sqrt{2}} //$$

$$(3) \cos 15^\circ$$

$$(\text{式}) = \cos(45^\circ - 30^\circ) = \cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ \\ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2} = \frac{\sqrt{3} + 1}{2\sqrt{2}} = \frac{\sqrt{6} + \sqrt{2}}{4} //$$

3 2直線 $3x - y - 1 = 0$, $x - 2y + 2 = 0$ のなす

角 θ を求めよ。ただし、 $0 < \theta < \frac{\pi}{2}$ とする。

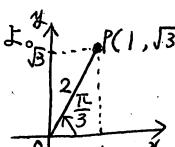
$$y = 3x - 1, \quad y = \frac{1}{2}x + 1 = 0 \text{ と } x \text{ 軸の正の部分がなす角を } \alpha, \beta \text{ とおくと} \\ \tan \alpha = 3, \tan \beta = \frac{1}{2} \\ \text{図より } \alpha + \beta = \alpha \Leftrightarrow \alpha' = \beta - \alpha \\ \tan \alpha' = \tan(\beta - \alpha) \\ = \frac{\tan \beta - \tan \alpha}{1 + \tan \beta \tan \alpha} = \frac{\frac{1}{2} - 3}{1 + \frac{1}{2} \times 3} \\ = \frac{-\frac{5}{2}}{\frac{5}{2}} = -1 \text{ より } \alpha' = \frac{3}{4}\pi \\ 0 < \theta < \frac{\pi}{2} \text{ より} \quad \theta = \pi - \frac{3}{4}\pi = \frac{\pi}{4} //$$

4 $0 \leq x \leq \pi$ のとき、次の関数の最大値と最小値、

およびそのときの x の値を求めよ。

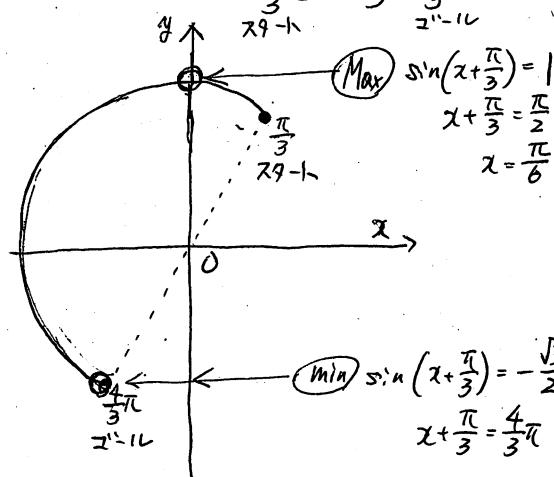
$$y = \sin x + \sqrt{3} \cos x$$

$$y = 2 \sin\left(x + \frac{\pi}{3}\right)$$



$$0 \leq x \leq \pi \text{ より } \frac{\pi}{3} \leq x + \frac{\pi}{3} \leq \pi + \frac{\pi}{3}$$

$$\frac{\pi}{3} \leq x + \frac{\pi}{3} \leq \frac{4}{3}\pi$$



$$-\frac{\sqrt{3}}{2} \leq \sin\left(x + \frac{\pi}{3}\right) \leq 1$$

$$-\sqrt{3} \leq 2 \sin\left(x + \frac{\pi}{3}\right) \leq 2 \quad \therefore -\sqrt{3} \leq y \leq 2$$

よし

$$x = \frac{\pi}{6} \text{ のとき最大値 } 2$$

$$x = \pi \text{ のとき最小値 } -\sqrt{3} //$$

ショートトライアル 三角関数 6

____組____番 氏名 _____

[1] $0 \leq x < 2\pi$ のとき、次の不等式を解け。

$$(1) \tan x < \frac{1}{\sqrt{3}}$$

$$(2) 2 \cos x + \sqrt{3} > 0$$

[2] $\frac{\pi}{2} \leq x \leq \frac{3}{2}\pi$ のとき、次の関数の最大値と最小値、
およびそのときの x の値を求めよ。

$$y = \sqrt{3} \sin x - \cos x$$

[3] $\frac{\pi}{2} < \alpha < \pi$ で $\sin \alpha = \frac{3}{5}$ のとき、次の値を求めよ。

$$(1) \sin 2\alpha$$

$$(2) \cos 2\alpha$$

$$(3) \cos \frac{\alpha}{2}$$

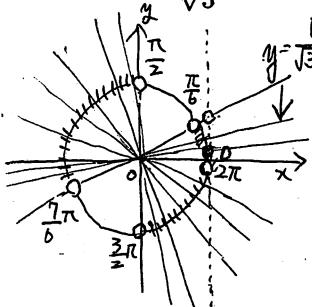
$$(4) \tan \frac{\alpha}{2}$$

ショートトライアル 三角関数 6

組 番 氏名 _____

- 1) $0 \leq x < 2\pi$ のとき、次の不等式を解け。

$$(1) \tan x < \frac{1}{\sqrt{3}}$$



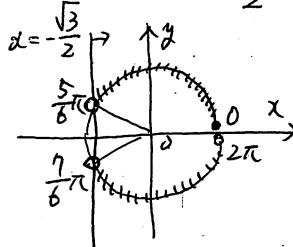
$$0 \leq x < 2\pi \text{ より}$$

$$0 \leq x < \frac{\pi}{6}, \frac{\pi}{2} < x < \frac{7}{6}\pi$$

$$\frac{3}{2}\pi < x < 2\pi$$

$$(2) 2\cos x + \sqrt{3} > 0$$

$$\cos x > -\frac{\sqrt{3}}{2}$$



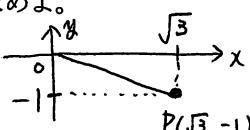
$$0 \leq x < 2\pi \text{ より}$$

$$0 \leq x < \frac{5}{6}\pi, \frac{7}{6}\pi < x < 2\pi$$

- 2) $\frac{\pi}{2} \leq x \leq \frac{3}{2}\pi$ のとき、次の関数の最大値と最小値、およびそのときの x の値を求めよ。

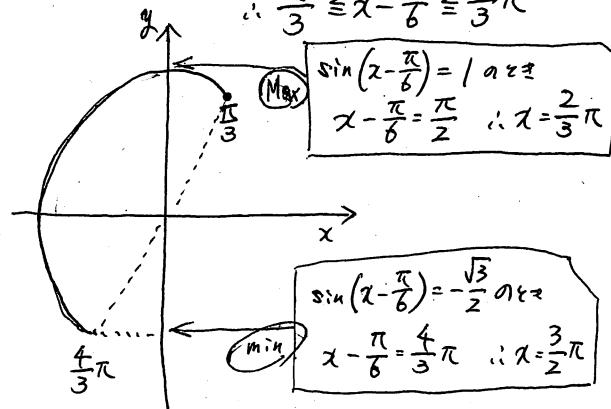
$$y = \sqrt{3}\sin x - \cos x$$

$$y = 2\sin\left(x - \frac{\pi}{6}\right)$$



$$\frac{\pi}{2} \leq x \leq \frac{3}{2}\pi \text{ より } \frac{\pi}{2} - \frac{\pi}{6} \leq x - \frac{\pi}{6} \leq \frac{3}{2}\pi - \frac{\pi}{6}$$

$$\therefore \frac{\pi}{3} \leq x - \frac{\pi}{6} \leq \frac{4}{3}\pi$$



$$-\frac{\sqrt{3}}{2} \leq \sin\left(x - \frac{\pi}{6}\right) \leq 1 \text{ より}$$

$$-\sqrt{3} \leq 2\sin\left(x - \frac{\pi}{6}\right) \leq 2 \quad \therefore -\sqrt{3} \leq y \leq 2$$

よって

$$x = \frac{2}{3}\pi \text{ のとき最大値 } 2, x = \frac{3}{2}\pi \text{ のとき最小値 } -\sqrt{3}$$

- 3) $\frac{\pi}{2} < \alpha < \pi$ で $\sin \alpha = \frac{3}{5}$ のとき、次の値を求めよ。

$$(1) \sin 2\alpha$$

$$\frac{\pi}{2} < \alpha < \pi \text{ なので } (\alpha \text{ は第2象限の角}) \cos \alpha < 0$$

$$\therefore \cos \alpha = -\sqrt{1 - \sin^2 \alpha} = -\sqrt{1 - \left(\frac{3}{5}\right)^2} = -\frac{4}{5}$$

よって

$$\sin 2\alpha = 2\sin \alpha \cos \alpha$$

$$= 2 \cdot \frac{3}{5} \cdot \left(-\frac{4}{5}\right) = -\frac{24}{25}$$

$$(2) \cos 2\alpha$$

$$\cos 2\alpha = 1 - 2\sin^2 \alpha$$

$$= 1 - 2 \cdot \left(\frac{3}{5}\right)^2 = \frac{7}{25}$$

$$(3) \cos \frac{\alpha}{2}$$

$$\begin{aligned} 2\cos^2 \theta - 1 &= \cos 2\theta \text{ より} \\ \cos^2 \theta &= \frac{1}{2}(1 + \cos 2\theta) \\ \cos \frac{\alpha}{2} &= \frac{1}{2}(1 + \cos \alpha) \end{aligned}$$

$$\cos^2 \frac{\alpha}{2} = \frac{1}{2}(1 + \cos \alpha) = \frac{1}{2}\{1 + \left(-\frac{4}{5}\right)\} = \frac{1}{10}$$

$$\frac{\pi}{2} < \alpha < \pi \text{ より } \frac{\pi}{4} < \frac{\alpha}{2} < \frac{\pi}{2} \text{ だから} s$$

$$\cos \frac{\alpha}{2} > 0. \quad \left(\frac{\alpha}{2} \text{ は第1象限の角}\right)$$

$$\therefore \cos \frac{\alpha}{2} = \frac{1}{\sqrt{10}}$$

$$(4) \tan \frac{\alpha}{2}$$

$$\frac{\pi}{4} < \frac{\alpha}{2} < \frac{\pi}{2} \text{ より } \sin \frac{\alpha}{2} > 0$$

$$\sin \frac{\alpha}{2} = \sqrt{1 - \cos^2 \frac{\alpha}{2}} = \sqrt{1 - \frac{1}{10}} = \frac{3}{\sqrt{10}}$$

$$\tan \frac{\alpha}{2} = \frac{\sin \frac{\alpha}{2}}{\cos \frac{\alpha}{2}} = \frac{\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}} = 3$$

ショートトライアル 三角関数 7

____組____番 氏名 _____

- [1] 半径が 4, 中心角が $\frac{5}{6}\pi$ の扇形と弧の長さ ℓ と面積 S を求めよ。

$$(3) \sin \theta + \cos \theta < \frac{1}{\sqrt{2}}$$

- [2] $0 \leq \theta < 2\pi$ のとき, 次の方程式・不等式を解け。

$$(1) \tan \theta = -\sqrt{3}$$

- [3] 次の値を求めよ。

$$(1) \sin \frac{25}{6}\pi$$

$$(2) 2 \cos^2 \theta + 2 > -7 \sin \theta$$

$$(2) \cos \left(-\frac{10}{3}\pi \right)$$

- [4] 関数 $y = \cos(3\theta - \pi)$ のグラフをかけ。また、その周期をいえ。

ショートトライアル 三角関数 7

組 番 氏名 _____

- [1] 半径が 4, 中心角が $\frac{5}{6}\pi$ の扇形と弧の長さ l と面積 S を求めよ。

$$l = r\theta$$

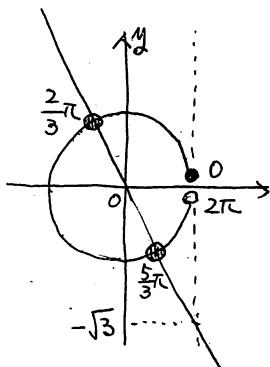
$$l = 4 \times \frac{5}{6}\pi = \frac{10}{3}\pi$$

$$S = \frac{1}{2}lr$$

$$S = \frac{1}{2} \times \frac{10}{3}\pi \times 4 = \frac{20}{3}\pi$$

- [2] $0 \leq \theta < 2\pi$ のとき、次の方程式・不等式を解け。

(1) $\tan \theta = -\sqrt{3}$



$$0 \leq \theta < 2\pi \text{ より}$$

$$\theta = \frac{2}{3}\pi, \frac{5}{3}\pi$$

(2) $2\cos^2 \theta + 2 > -7\sin \theta$

$$2(1-\sin^2 \theta) + 2 > -7\sin \theta$$

$$2\sin^2 \theta - 7\sin \theta - 4 < 0$$

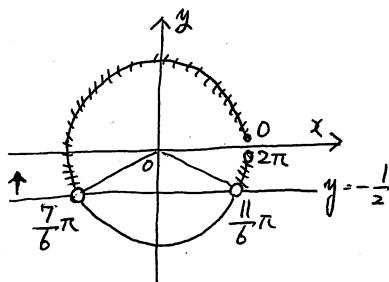
$$\frac{2}{1} \times \frac{1}{-4} - \frac{1}{-7}$$

$$(2\sin \theta + 1)(\sin \theta - 4) < 0$$

$$-\frac{1}{2} < \sin \theta < 4$$

もともと $-1 \leq \sin \theta \leq 1$ なので

$$-\frac{1}{2} < \sin \theta \leq 1$$



$$0 \leq \theta < 2\pi \text{ より}$$

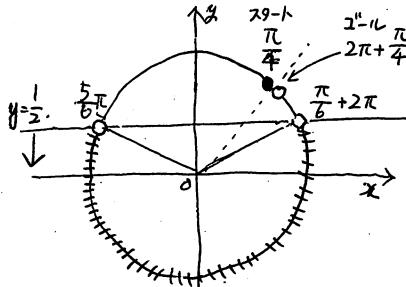
$$0 \leq \theta < \frac{7}{6}\pi, \frac{11}{6}\pi < \theta < 2\pi$$

(3) $\sin \theta + \cos \theta < \frac{1}{\sqrt{2}}$

$$\sqrt{2} \sin\left(\theta + \frac{\pi}{4}\right) < \frac{1}{\sqrt{2}}$$

$$\sin\left(\theta + \frac{\pi}{4}\right) < \frac{1}{2}$$

$$0 \leq \theta < 2\pi \text{ より } 0 + \frac{\pi}{4} \leq \theta + \frac{\pi}{4} < 2\pi + \frac{\pi}{4} \text{ だから}$$



$$\frac{5}{6}\pi < \theta + \frac{\pi}{4} < \frac{\pi}{6} + 2\pi$$

$$\frac{7}{12}\pi < \theta < \frac{23}{12}\pi$$

- [3] 次の値を求めよ。

(1) $\sin \frac{25}{6}\pi$ (5式) $= \sin\left(\frac{\pi}{6} + 4\pi\right) = \sin\frac{\pi}{6} = \frac{1}{2}$

(2) $\cos\left(-\frac{10}{3}\pi\right)$

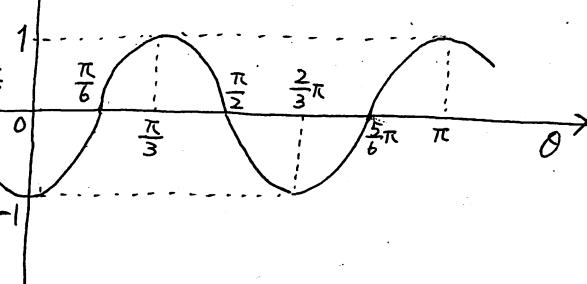
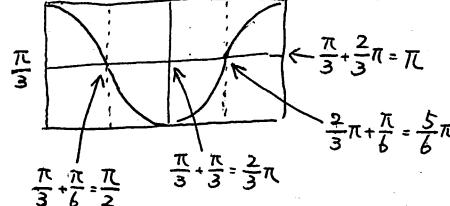
$$(5式) = \cos\frac{10}{3}\pi = \cos\left(\frac{4}{3}\pi + 2\pi\right) = \cos\frac{4}{3}\pi = -\frac{1}{2}$$

- [4] 関数 $y = \cos(3\theta - \pi)$ のグラフをかけ。また、その周期をいえ。

$$y = \cos 3\left(\theta - \frac{\pi}{3}\right) \text{ より } y = \cos 3\theta \text{ は } \theta \text{ 軸を向く } \frac{\pi}{3} \text{ 平行移動}$$

$$\text{周期は } \frac{2\pi}{3} \text{ より } y + \pi \text{ は } y = \cos(3\theta + \pi) = \cos(-\pi) = \cos\pi = -1$$

下書きは



ショートトライアル 三角関数 8

____組____番 氏名 _____

- 1 次の関数の最大値と最小値を求めよ。

$$y = 5 \cos^2 x + 6 \sin x \cos x - 3 \sin^2 x \quad (0 \leq x < 2\pi)$$

- 2 次の関数の最大値、最小値と、そのときの x の値を求めよ。

$$y = \sqrt{2}(\sin x + \cos x) - \sin x \cos x - 1 \quad (0 \leq x < 2\pi)$$

ショートトライアル 三角関数 8

組 番 氏名 _____

- [1] 次の関数の最大値と最小値を求めよ。

$$y = 5 \cos^2 x + 6 \sin x \cos x - 3 \sin^2 x \quad (0 \leq x < 2\pi)$$

$$2 \cos^2 x - 1 = \cos 2x \Leftrightarrow \cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

$$2 \sin x \cos x = \sin 2x \Leftrightarrow \sin x \cos x = \frac{1}{2} \sin 2x$$

$$1 - 2 \sin^2 x = \cos 2x \Leftrightarrow \sin^2 x = \frac{1}{2}(1 - \cos 2x) \text{ たゞさ}$$

$$y = 5 \cdot \frac{1}{2}(1 + \cos 2x) + 6 \times \frac{1}{2} \sin 2x - 3 \times \frac{1}{2}(1 - \cos 2x)$$

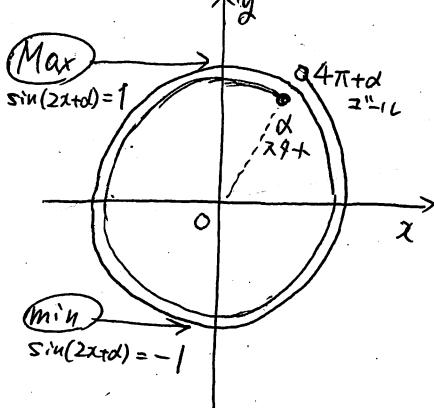
$$= \frac{5}{2} + \frac{5}{2} \cos 2x + 3 \sin 2x - \frac{3}{2} + \frac{3}{2} \cos 2x$$

$$= 3 \sin 2x + 4 \cos 2x + 1$$

$$\text{たゞさ}, \cos d = \frac{3}{5}, \sin d = \frac{4}{5} \text{ たゞさ}$$

$$0 \leq x < 2\pi \text{ より } 0 \times 2 \leq x \times 2 < 2\pi \times 2$$

$$0 + d \leq 2x + d \leq 4\pi + d$$



$$\text{図より} \quad -1 \leq \sin(2x+d) \leq 1 \text{ たゞさ} \quad \text{全体}$$

$$-5 \leq 5 \sin(2x+d) \leq 5 \quad \downarrow \times 5$$

$$-5 + 1 \leq 5 \sin(2x+d) + 1 \leq 5 + 1 \quad \downarrow +1$$

$$\therefore -4 \leq y \leq 6$$

よって 最大値 6, 最小値 -4

- [2] 次の関数の最大値、最小値と、そのときの x の値を求めよ。

$$y = \sqrt{2}(\sin x + \cos x) - \sin x \cos x - 1 \quad (0 \leq x < 2\pi)$$

$$\sin x + \cos x = t \text{ とおいて両辺} 2 \text{乗して}$$

$$(\sin x + \cos x)^2 = t^2$$

$$\sin^2 x + 2 \sin x \cos x + \cos^2 x = t^2$$

$$1 + 2 \sin x \cos x = t^2$$

$$\therefore \sin x \cos x = \frac{t^2 - 1}{2} \text{ たゞさ}$$

$$y = \sqrt{2}t - \frac{t^2 - 1}{2} - 1 = \sqrt{2}t - \frac{1}{2}t^2 + \frac{1}{2} - 1$$

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

$$= -\frac{1}{2}(t - \sqrt{2})^2 + \frac{1}{2} \quad \cdots \textcircled{1}$$

$$\text{また } t = \sin x + \cos x \text{ は } 7112$$

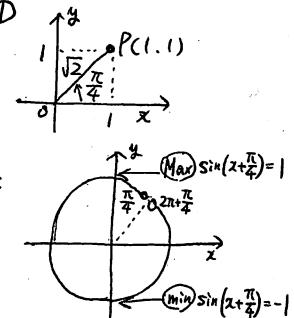
$$t = \sqrt{2} \sin\left(x + \frac{\pi}{4}\right)$$

$$0 \leq x < 2\pi \text{ より } \frac{\pi}{4} \leq x + \frac{\pi}{4} < 2\pi + \frac{\pi}{4}$$

$$-1 \leq \sin\left(x + \frac{\pi}{4}\right) \leq 1 \text{ たゞさ}$$

$$-\sqrt{2} \leq \sqrt{2} \sin\left(x + \frac{\pi}{4}\right) \leq \sqrt{2}$$

$$\therefore -\sqrt{2} \leq t \leq \sqrt{2} \quad \cdots \textcircled{2}$$



①と②より

$$t = \sqrt{2} \text{ とき } \text{Max } \frac{1}{2}$$

$$t = -\sqrt{2} \text{ とき } \text{min}$$

$$y = -\frac{1}{2}(-\sqrt{2} - \sqrt{2})^2 + \frac{1}{2} \\ = -\frac{1}{2}(-2\sqrt{2})^2 + \frac{1}{2} \\ = -4 + \frac{1}{2} = -\frac{7}{2}$$

$$\text{Max } t = \sqrt{2} \text{ とき } t = \sqrt{2}$$

$$\sqrt{2} \sin\left(x + \frac{\pi}{4}\right) = \sqrt{2}$$

$$\sin\left(x + \frac{\pi}{4}\right) = 1$$

$$x + \frac{\pi}{4} = \frac{\pi}{2}$$

$$x = \frac{\pi}{4}$$

$$\sqrt{2} \sin\left(x + \frac{\pi}{4}\right) = -\sqrt{2}$$

$$\sin\left(x + \frac{\pi}{4}\right) = -1$$

$$x + \frac{\pi}{4} = \frac{3\pi}{2}$$

$$x = \frac{5}{4}\pi$$

以上より

$$x = \frac{\pi}{4} \text{ のとき最大値 } \frac{1}{2}, x = \frac{5}{4}\pi \text{ のとき最小値 } -\frac{7}{2}$$