α, β が鋭角で、

$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、

$\tan(\alpha+\beta)$、$\alpha+\beta$ の値を

それぞれ求めよ。

今回の学習目標

タンジェントの加法定理

- サインとコサインの加法定理から導く

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正接の加法定理

$\boxed{\mathbf{3}}$

$$\tan(\alpha+\beta)=\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$$

$$\tan(\alpha-\beta)=\frac{\tan\alpha-\tan\beta}{1+\tan\alpha\tan\beta}$$

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正接の加法定理の証明

$$\tan(\alpha+\beta) = \frac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)}$$

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正接の加法定理の証明

$$\tan(\alpha+\beta) = \frac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)} = \frac{\sin\alpha\cos\beta+\cos\alpha\sin\beta}{\cos\alpha\cos\beta-\sin\alpha\sin\beta}$$

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正接の加法定理の証明

$$\tan(\alpha+\beta) = \frac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)} = \frac{\sin\alpha\cos\beta + \cos\alpha\sin\beta}{\cos\alpha\cos\beta - \sin\alpha\sin\beta}$$

$$= \frac{\dfrac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta} + \dfrac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta}}{\dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} - \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta}}$$

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正接の加法定理の証明

$$\tan(\alpha+\beta) = \frac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)} = \frac{\sin\alpha\cos\beta+\cos\alpha\sin\beta}{\cos\alpha\cos\beta-\sin\alpha\sin\beta}$$

$$= \frac{\dfrac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta}+\dfrac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta}}{\dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta}-\dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta}}$$

$$= \frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$$

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正接の加法定理の証明

$$\tan(\alpha - \beta) = \frac{\sin(\alpha - \beta)}{\cos(\alpha - \beta)}$$

正接の加法定理の証明

$$\tan(\alpha - \beta) = \frac{\sin(\alpha - \beta)}{\cos(\alpha - \beta)} = \frac{\sin\alpha\cos\beta - \cos\alpha\sin\beta}{\cos\alpha\cos\beta + \sin\alpha\sin\beta}$$

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正接の加法定理の証明

$$\tan(\alpha-\beta)=\frac{\sin(\alpha-\beta)}{\cos(\alpha-\beta)}=\frac{\sin\alpha\cos\beta-\cos\alpha\sin\beta}{\cos\alpha\cos\beta+\sin\alpha\sin\beta}$$

$$=\frac{\dfrac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta}-\dfrac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta}}{\dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta}+\dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta}}$$

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正接の加法定理の証明

$$\tan(\alpha-\beta)=\frac{\sin(\alpha-\beta)}{\cos(\alpha-\beta)}=\frac{\sin\alpha\cos\beta-\cos\alpha\sin\beta}{\cos\alpha\cos\beta+\sin\alpha\sin\beta}$$

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$$=\frac{\tan\alpha-\tan\beta}{1+\tan\alpha\tan\beta}$$

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正接の加法定理

$\boxed{\mathbf{3}}$

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

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例 1　$\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ)$$

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例 1　$\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) \quad = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

例 1　$\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

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

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例 1　$\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - 1 \cdot \frac{1}{\sqrt{3}}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

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例 1 $\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - 1 \cdot \frac{1}{\sqrt{3}}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

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

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例 1 $\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - 1 \cdot \frac{1}{\sqrt{3}}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

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$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

$$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - 1 \cdot \frac{1}{\sqrt{3}}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

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

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例 1　$\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

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$$= \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

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

$$= \frac{4 + 2\sqrt{3}}{2}$$

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$\boxed{例 1}$ $\tan 75^\circ$ の値を求めよ。

$$\tan 75^\circ = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ + \tan 30^\circ}{1 - \tan 45^\circ \cdot \tan 30^\circ}$$

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$$= \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

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

$$= \frac{4 + 2\sqrt{3}}{2} = 2 + \sqrt{3}$$

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ビデオを止めて問題を解いてみよう

問 1 次の値を求めよ。

(1) $\tan 15^\circ$, (2) $\tan 105^\circ$

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問 1　(1)　$\tan 15^\circ$

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問 1　(1)　$\tan 15^\circ = \tan(60^\circ - 45^\circ)$

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問 1 (1)

$$\tan 15^\circ = \tan(60^\circ - 45^\circ)$$

$$= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ}$$

問 1　(1)

$$\tan 15^\circ = \tan(60^\circ - 45^\circ)$$
$$= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ}$$
$$= \frac{\sqrt{3} - 1}{1 + \sqrt{3} \cdot 1}$$

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問 1　(1)

$$
\begin{aligned}
\tan 15^\circ &= \tan(60^\circ - 45^\circ) \\
&= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ} \\
&= \frac{\sqrt{3} - 1}{1 + \sqrt{3} \cdot 1} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1}
\end{aligned}
$$

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問 1

(1)

$$
\begin{aligned}
\tan 15^\circ &= \tan(60^\circ - 45^\circ) \\
&= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ} \\
&= \frac{\sqrt{3} - 1}{1 + \sqrt{3} \cdot 1} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1} \\
&= \frac{3 - 2\sqrt{3} + 1}{3 - 1}
\end{aligned}
$$

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問 1

(1)

$$
\begin{aligned}
\tan 15^\circ &= \tan(60^\circ - 45^\circ)\\
&= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ}\\
&= \frac{\sqrt{3}-1}{1+\sqrt{3}\cdot 1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}\\
&= \frac{3-2\sqrt{3}+1}{3-1}\\
&= \frac{4-2\sqrt{3}}{2}
\end{aligned}
$$

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問 1

(1)

$$
\begin{aligned}
\tan 15^\circ &= \tan(60^\circ - 45^\circ) \\
&= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ} \\
&= \frac{\sqrt{3} - 1}{1 + \sqrt{3} \cdot 1} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1} \\
&= \frac{3 - 2\sqrt{3} + 1}{3 - 1} \\
&= \frac{4 - 2\sqrt{3}}{2} = 2 - \sqrt{3}
\end{aligned}
$$

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問 1 (2) $\tan 105^\circ$

問 1　(2)　$\tan 105^\circ = \tan(60^\circ + 45^\circ)$

問 1　(2)

$$\tan 105^\circ = \tan(60^\circ + 45^\circ)$$

$$= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ}$$

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問 1　(2)

$$
\begin{aligned}
\tan 105^\circ &= \tan(60^\circ + 45^\circ) \\
&= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ} \\
&= \frac{\sqrt{3} + 1}{1 - \sqrt{3} \cdot 1}
\end{aligned}
$$

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問 1　(2)

$$\begin{aligned}\tan 105^\circ &= \tan(60^\circ + 45^\circ)\\ &= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ}\\ &= \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1} \times \frac{1+\sqrt{3}}{1+\sqrt{3}}\end{aligned}$$

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問 1　(2)

$$
\begin{aligned}
\tan 105^\circ &= \tan(60^\circ + 45^\circ) \\
&= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ} \\
&= \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1} \times \frac{1+\sqrt{3}}{1+\sqrt{3}} \\
&= \frac{3+2\sqrt{3}+1}{1-3}
\end{aligned}
$$

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問 1　(2)

$$
\begin{aligned}
\tan 105^\circ &= \tan(60^\circ + 45^\circ) \\
&= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ} \\
&= \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1} \times \frac{1+\sqrt{3}}{1+\sqrt{3}} \\
&= \frac{3+2\sqrt{3}+1}{1-3} \\
&= \frac{4+2\sqrt{3}}{-2}
\end{aligned}
$$

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問 1 (2)

$$
\begin{aligned}
\tan 105^\circ &= \tan(60^\circ + 45^\circ) \\
&= \frac{\tan 60^\circ + \tan 45^\circ}{1 - \tan 60^\circ \tan 45^\circ} \\
&= \frac{\sqrt{3}+1}{1-\sqrt{3}\cdot 1} \times \frac{1+\sqrt{3}}{1+\sqrt{3}} \\
&= \frac{3+2\sqrt{3}+1}{1-3} \\
&= \frac{4+2\sqrt{3}}{-2} = -2-\sqrt{3}
\end{aligned}
$$

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例 2 α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、$\tan(\alpha+\beta)$、$\alpha+\beta$ の値をそれぞれ求めよ。

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例 2　α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、
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$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

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例 2　α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、$\tan(\alpha+\beta)$、$\alpha+\beta$ の値をそれぞれ求めよ。

$$\begin{aligned}\tan(\alpha+\beta) &= \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} \\ &= \frac{\frac{1}{3} + \frac{1}{2}}{1 - \frac{1}{3}\cdot\frac{1}{2}}\end{aligned}$$

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$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$
$$= \frac{\frac{1}{3} + \frac{1}{2}}{1 - \frac{1}{3}\cdot\frac{1}{2}}$$
$$= \frac{\frac{5}{6}}{1 - \frac{1}{6}}$$

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

$$= \frac{\frac{5}{6}}{1 - \frac{1}{6}} = 1$$

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$\boxed{\text{例 2}}$ α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、
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$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} = \frac{\frac{1}{3}+\frac{1}{2}}{1-\frac{1}{3}\cdot\frac{1}{2}} = \frac{\frac{5}{6}}{1-\frac{1}{6}} = 1$$

$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、

例 2　α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、
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$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、
$0^\circ < \alpha+\beta < 180^\circ$

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$$= \frac{\frac{5}{6}}{1 - \frac{1}{6}} = 1$$

$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、

$0^\circ < \alpha + \beta < 180^\circ \quad \rightarrow \quad \alpha+\beta = 45^\circ$

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例 2　α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、$\tan(\alpha+\beta)$、$\alpha+\beta$ の値をそれぞれ求めよ。

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} = \frac{\frac{1}{3}+\frac{1}{2}}{1-\frac{1}{3}\cdot\frac{1}{2}} = \frac{\frac{5}{6}}{1-\frac{1}{6}} = 1$$

$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、

$0^\circ < \alpha+\beta < 180^\circ \quad \to \quad \alpha+\beta = 45^\circ$

答　$\tan(\alpha+\beta) = 1,\quad \alpha+\beta = 45^\circ$

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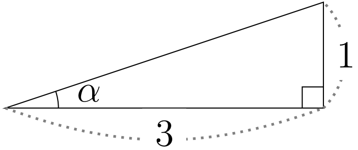
例 2　α, β が鋭角で、$\tan\alpha = \frac{1}{3}$、$\tan\beta = \frac{1}{2}$ のとき、$\tan(\alpha+\beta)$、$\alpha+\beta$ の値をそれぞれ求めよ。

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} = \frac{\frac{1}{3}+\frac{1}{2}}{1-\frac{1}{3}\cdot\frac{1}{2}} = \frac{\frac{5}{6}}{1-\frac{1}{6}} = 1$$



$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、

$0^\circ < \alpha+\beta < 180^\circ \quad \rightarrow \quad \alpha+\beta = 45^\circ$

答　$\tan(\alpha+\beta) = 1,\quad \alpha+\beta = 45^\circ$

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$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$
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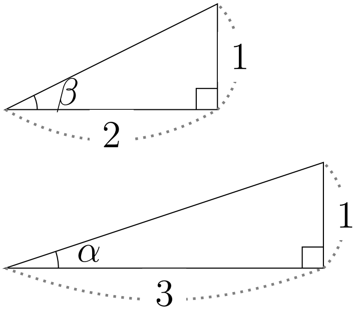
$$= \frac{\frac{5}{6}}{1-\frac{1}{6}} = 1$$



$0^\circ < \alpha < 90^\circ,\ 0^\circ < \beta < 90^\circ$ であるので、
$0^\circ < \alpha+\beta < 180^\circ \quad \rightarrow \quad \alpha+\beta = 45^\circ$

答　$\tan(\alpha+\beta) = 1,\quad \alpha+\beta = 45^\circ$

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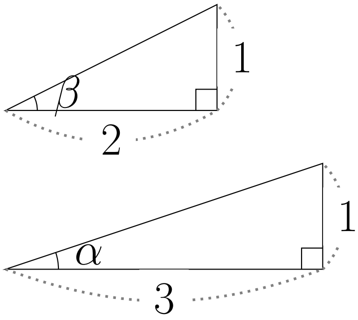

$$\alpha+\beta=45^\circ$$

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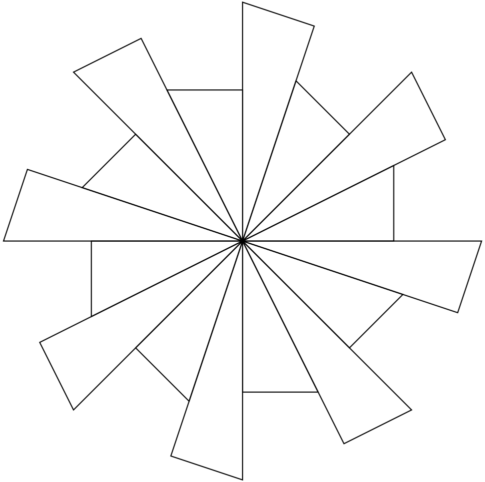

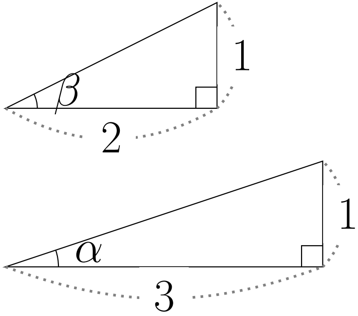

$$\alpha + \beta = 45^\circ$$

ビデオを止めて問題を解いてみよう

問 2 α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha - \beta)$ の値を求めよ。

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$$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

問 2　α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2} - \frac{1}{4}}{1 + \frac{1}{2}\cdot\frac{1}{4}}$$

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問 2 α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2}-\frac{1}{4}}{1+\frac{1}{2}\cdot\frac{1}{4}} = \frac{\frac{1}{4}}{1+\frac{1}{8}}$$

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問 2　α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2} - \frac{1}{4}}{1 + \frac{1}{2}\cdot\frac{1}{4}} = \frac{\frac{1}{4}}{1 + \frac{1}{8}} = \frac{\frac{1}{4}}{\frac{9}{8}}$$

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$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2}-\frac{1}{4}}{1+\frac{1}{2}\cdot\frac{1}{4}} = \frac{\frac{1}{4}}{1+\frac{1}{8}} = \frac{\frac{1}{4}}{\frac{9}{8}} = \frac{2}{9}$$

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問 2 α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2}-\frac{1}{4}}{1+\frac{1}{2}\cdot\frac{1}{4}} = \frac{\frac{1}{4}}{1+\frac{1}{8}} = \frac{\frac{1}{4}}{\frac{9}{8}} = \frac{2}{9}$$

答 $\tan(\alpha-\beta) = \frac{2}{9}$

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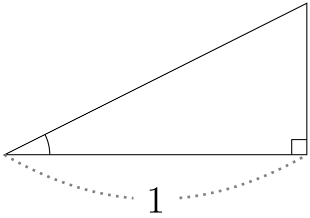
問 2　α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

$$= \frac{\frac{1}{2}-\frac{1}{4}}{1+\frac{1}{2}\cdot\frac{1}{4}} = \frac{\frac{1}{4}}{1+\frac{1}{8}} = \frac{\frac{1}{4}}{\frac{9}{8}} = \frac{2}{9}$$



答　$\tan(\alpha-\beta) = \frac{2}{9}$

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問 2 α, β が鋭角で、$\tan\alpha = \frac{1}{2}$、$\tan\beta = \frac{1}{4}$ のとき、$\tan(\alpha-\beta)$ の値を求めよ。

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$$

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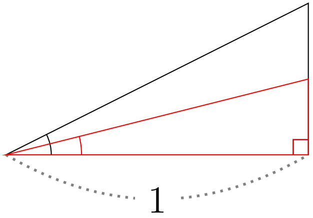

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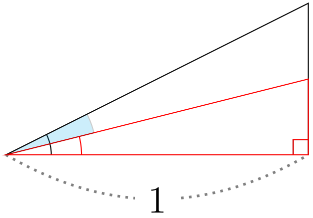

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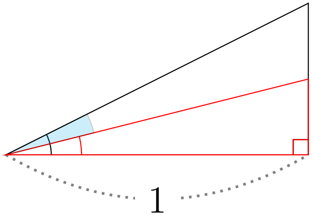

$\boxed{\text{答}}$　$\underline{\tan(\alpha-\beta) = \frac{2}{9}}$

※ $\frac{2}{9} = 0.2222,\qquad \tan^{-1}(0.2222) = 12.52^\circ$

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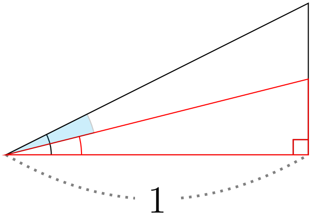

※ $\frac{2}{9} = 0.2222,\qquad \tan^{-1}(0.2222) = 12.52^\circ$

$\tan^{-1}(0.5) = 26.56^\circ$

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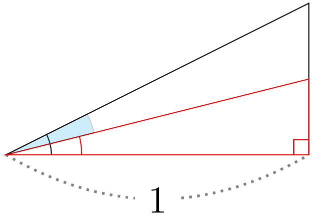
答 $\tan(\alpha-\beta) = \frac{2}{9}$



※ $\frac{2}{9} = 0.2222$, $\tan^{-1}(0.2222) = 12.52^\circ$

$\tan^{-1}(0.5) = 26.56^\circ$

$\tan^{-1}(0.25) = 14.04^\circ$

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今回の学習目標

タンジェントの加法定理

- サインとコサインの加法定理から導く

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