

$$\textcircled{1} \sin x = \frac{2}{3}, \cos x$$

$$\textcircled{0^\circ < x < 90^\circ}$$

$$\left(\frac{2}{3}\right)^2 + \cos^2 x = 1 \quad -\frac{4}{9}$$

$$\cos^2 x = \frac{5}{9}$$

$$\cos x = \frac{\sqrt{5}}{3}$$

$$\textcircled{2} \tan x = \frac{7}{2}, \sin x$$

$$\downarrow$$

$$\cot x = \frac{2}{7}$$

$$1 + \left(\frac{2}{7}\right)^2 = \csc^2 x$$

$$1 + \frac{4}{49}$$

$$\sin x = \frac{2}{\sqrt{53}}$$

$$\textcircled{\sin x = \frac{7\sqrt{53}}{53}}$$

$$\frac{53}{49} = \csc^2 x$$

$$\frac{\sqrt{53}}{7} = \csc x$$

3 Find the value of $\sin(x - y)$ if $0 < x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$, $\sin x = \frac{9}{41}$, and $\sin y = \frac{7}{25}$.

$$\begin{aligned}\sin(x-y) &= \sin x \cos y - \cos x \sin y \\ &= \left(\frac{9}{41}\right) \left(\frac{24}{25}\right) - \left(\frac{40}{41}\right) \left(\frac{7}{25}\right) \\ &= \frac{216}{1025} - \frac{280}{1025} \\ &= -\frac{64}{1025}\end{aligned}$$

$$\sin^2 y + \cos^2 y = 1.$$

$$\left(\frac{9}{41}\right)^2 + \cos^2 x = 1$$

$$-\frac{81}{1681}$$

$$\cos^2 x = \frac{1600}{1681}$$

$$\cos x = \frac{40}{41}$$

$$\left(\frac{7}{25}\right)^2 + \cos^2 y = 1$$

$$-\frac{49}{625}$$

$$\cos^2 y = \frac{576}{625}$$

$$\cos y = \frac{24}{25}$$

Find $\cos(x+y)$ $\sin x = \frac{4}{9}$ and $\sin y = \frac{1}{4}$ $0 < x < \frac{\pi}{2}$ $0 < y < \frac{\pi}{2}$

$$\begin{aligned}\cos(x+y) &= \cos x \cos y - \sin x \sin y \\ &= \left(\frac{\sqrt{65}}{9}\right) \left(\frac{\sqrt{15}}{4}\right) - \left(\frac{4}{9}\right) \left(\frac{1}{4}\right) \\ &= \frac{\sqrt{975} - 4}{36} \\ &= \frac{5\sqrt{39} - 4}{36}\end{aligned}$$

$$\left(\frac{4}{9}\right)^2 + \cos^2 x = 1$$

$$-\frac{16}{81}$$

$$\frac{\sqrt{975}}{\sqrt{25}\sqrt{39}}$$

$$\cos^2 x = \frac{65}{81}$$

$$\cos x = \frac{\sqrt{65}}{9}$$

$$\left(\frac{1}{4}\right)^2 + \cos^2 y = 1$$

$$-\frac{1}{16}$$

$$\cos^2 y = \frac{15}{16}$$

$$\cos y = \frac{\sqrt{15}}{4}$$

9. $\tan(x+y)$ if $\csc x = \frac{5}{3}$ and $\cos y = \frac{5}{13} \rightarrow \sec y = \frac{13}{5}$.

$$\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$$

$$= \frac{\frac{15}{20} + \frac{12}{5}}{1 - \left(\frac{3}{4}\right)\left(\frac{12}{5}\right)}$$

$$= \frac{\frac{63}{20}}{-\frac{16}{20}} = \frac{63}{20} \cdot -\frac{20}{16} = \left(-\frac{63}{16}\right)$$

$$-1 + \cot^2 x = \left(\frac{5}{3}\right)^2 - 1 \quad \left| \quad \tan^2 y + 1 = \left(\frac{13}{5}\right)^2 - 1\right.$$

$$\cot^2 x = \frac{16}{9}$$

$$\cot x = \frac{4}{3}$$

$$\tan x = \frac{3}{4}$$

$$\tan^2 y = \frac{144}{25}$$

$$\tan y = \frac{12}{5}$$

p. 445 mid-ch. Quiz

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Quiz Monday

7.1-7.3