

18. Cont.

b.

$$= \frac{-4 \cancel{\text{tg} x}}{(1 - \cancel{\text{tg}^2 x}) \cancel{\text{tg} x}} = \frac{-4}{1 - \text{tg}^2 x}$$

$$\frac{\text{tg}(\frac{\pi}{4} - x) - \text{tg}(\frac{\pi}{4} + x)}{\text{tg} x} = \frac{4}{\text{tg}^2 x - 1}$$

$$\begin{aligned} \cos 4x + \cos 3x &= \\ &= 2 \cos \frac{4x+3x}{2} \cos \frac{4x-3x}{2} \\ &= 2 \cos \frac{7x}{2} \cos \frac{x}{2} \end{aligned}$$

$$\begin{aligned} \sin 4x - \sin 3x &= \\ &= 2 \cos \frac{4x+3x}{2} \sin \frac{4x-3x}{2} \\ &= 2 \cos \frac{7x}{2} \sin \frac{x}{2} \end{aligned}$$

$$\frac{\cos 4x + \cos 3x}{\sin 4x - \sin 3x} = \frac{2 \cos \frac{7x}{2} \cos \frac{x}{2}}{2 \cos \frac{7x}{2} \sin \frac{x}{2}} = \cos \frac{x}{2}$$

19.

$$\left. \begin{aligned} \sin x &= -\frac{1}{3}, & \pi < x < \frac{3\pi}{2} \\ \cos y &= \frac{2}{5}, & \frac{3\pi}{2} < y < 2\pi \end{aligned} \right\}$$

$$\sin(x-y) = \frac{1}{\cos(x-y)}$$

Now

$$\cos(x-y) = \cos x \cos y + \sin x \sin y$$

Now

$$\pi < x < \frac{3\pi}{2} \Rightarrow \cos x < 0$$

$$\begin{aligned} \therefore \cos x &= -\sqrt{1 - \sin^2 x} \\ &= -\sqrt{1 - \frac{1}{9}} \end{aligned}$$

$$\| \cos x = -\frac{2\sqrt{2}}{3} \|$$

$$\frac{3\pi}{2} < y < 2\pi \Rightarrow \sin y < 0$$

$$\begin{aligned} \sin y &= -\sqrt{1 - \cos^2 y} \\ &= -\sqrt{1 - \frac{4}{25}} \end{aligned}$$

$$\| \sin y = -\frac{\sqrt{21}}{5} \|$$

$$\cos(x-y) = -\frac{2\sqrt{2}}{3} \cdot \frac{2}{5} + \frac{-1}{3} \cdot \frac{-\sqrt{21}}{5}$$

$$= -\frac{4\sqrt{2}}{15} + \frac{\sqrt{21}}{15} = \frac{\sqrt{21} - 4\sqrt{2}}{15}$$

$$\sin(x-y) = \frac{15}{\sqrt{21} - 4\sqrt{2}}$$