

17. Ans.

$$\begin{aligned}
 x) \sin 130^\circ - \sin 40^\circ &= \\
 &= 2 \cos \frac{130^\circ + 40^\circ}{2} \sin \frac{130^\circ - 40^\circ}{2} \\
 &= 2 \cos 85^\circ \sin 45^\circ \\
 &= \frac{2\sqrt{2} \cos 85^\circ}{\sqrt{2}} \\
 &= \sqrt{2} \cos 85^\circ
 \end{aligned}$$

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

18.

$$\begin{aligned}
 a) \sin(x-30^\circ) &= \\
 &= \sin x \cos 30^\circ - \sin 30^\circ \cos x \\
 &= \sin x \frac{\sqrt{3}}{2} - \frac{1}{2} \cos x
 \end{aligned}$$

$$\begin{aligned}
 \cos(60^\circ - x) &= \\
 &= \cos 60^\circ \cos x + \sin 60^\circ \sin x \\
 &= \frac{1}{2} \cos x + \frac{\sqrt{3}}{2} \sin x
 \end{aligned}$$

∴

$$\begin{aligned}
 \frac{\sin(x-30^\circ) + \cos(60^\circ-x)}{\sin x} &= \\
 &= \frac{\frac{\sqrt{3}}{2} \sin x - \frac{1}{2} \cos x + \frac{1}{2} \cos x + \frac{\sqrt{3}}{2} \sin x}{\sin x} \\
 &= \frac{\sqrt{3} \sin x}{\sin x} = \sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 b) \operatorname{tg}\left(\frac{\pi}{4} - x\right) &= \frac{\operatorname{tg} \frac{\pi}{4} - \operatorname{tg} x}{1 + \operatorname{tg} \frac{\pi}{4} \operatorname{tg} x} \\
 &= \frac{1 - \operatorname{tg} x}{1 + \operatorname{tg} x}
 \end{aligned}$$

$$\begin{aligned}
 \operatorname{tg}\left(\frac{\pi}{4} + x\right) &= \frac{\operatorname{tg} \frac{\pi}{4} + \operatorname{tg} x}{1 - \operatorname{tg} \frac{\pi}{4} \operatorname{tg} x} \\
 &= \frac{1 + \operatorname{tg} x}{1 - \operatorname{tg} x}
 \end{aligned}$$

$$\frac{\operatorname{tg}\left(\frac{\pi}{4} - x\right) - \operatorname{tg}\left(\frac{\pi}{4} + x\right)}{\operatorname{tg} x} =$$

$$= \frac{\frac{1 - \operatorname{tg} x}{1 + \operatorname{tg} x} - \frac{1 + \operatorname{tg} x}{1 - \operatorname{tg} x}}{\operatorname{tg} x}$$

$$= \frac{(1 - \operatorname{tg} x)^2 - (1 + \operatorname{tg} x)^2}{(1 - \operatorname{tg}^2 x) \operatorname{tg} x}$$

$$= \frac{1 - 2 \operatorname{tg} x + \operatorname{tg}^2 x - 1 - 2 \operatorname{tg} x - \operatorname{tg}^2 x}{(1 - \operatorname{tg}^2 x) \operatorname{tg} x}$$