(1) $\dfrac{\sin 47^\circ - \sin 17^\circ \cos 30^\circ}{\cos 17^\circ}$;

(2) $\tan 12^\circ + \tan 33^\circ + \tan 12^\circ \tan 33^\circ$;

(3) $(\tan 10^\circ - \sqrt{3}) \cdot \dfrac{\cos 10^\circ}{\overset{\sin}{\cancel{\cos}} 50^\circ}$;

(4) $\dfrac{2\cos 10^\circ - \sin 20^\circ}{\cos 20^\circ}$.

(2) $\tan 45^\circ = \tan(12^\circ + 33^\circ) = \dfrac{\tan 12^\circ + \tan 33^\circ}{1 - \tan 12^\circ \cdot \tan 33^\circ} = 1$

$\therefore \tan 12^\circ + \tan 33^\circ = 1 - \tan 12^\circ \tan 33^\circ$

$\therefore \tan 12^\circ + \tan 33^\circ + \tan 12^\circ \tan 33^\circ = 1$

(1) $\dfrac{\sin 47^\circ - \sin 17^\circ \cos 30^\circ}{\cos 17^\circ} = \dfrac{\sin 30^\circ \cos 17^\circ + \cos 30^\circ \sin 17^\circ - \sin 17^\circ \cos 30^\circ}{\cos 17^\circ} = \sin 30^\circ = \dfrac{1}{2}$

(3) $(\tan 10^\circ - \sqrt{3}) \cdot \dfrac{\cos 10^\circ}{\underset{\sin}{\cancel{\cos}} 50^\circ} = \dfrac{\tan 10^\circ \cdot \cos 10^\circ - \sqrt{3}\cos 10^\circ}{\underset{\sin}{\cancel{\cos}}\, 50^\circ} = \dfrac{\sin 10^\circ - \sqrt{3}\cos 10^\circ}{\underset{\sin}{\cancel{\cos}}\, 50^\circ}$

$= \dfrac{2(\frac{1}{2}\sin 10^\circ - \frac{\sqrt{3}}{2}\cos 10^\circ)}{\sin 50^\circ} = \dfrac{2(\cos 60^\circ \sin 10^\circ - \cos 10^\circ \sin 60^\circ)}{\sin 50^\circ}$

$= \dfrac{-2\sin 50^\circ}{\sin 50^\circ} = -2$

(4) $\dfrac{2\cos 10^\circ - \sin 20^\circ}{\cos 20^\circ} = \dfrac{2\cos(30^\circ-20^\circ)-\sin 20^\circ}{\cos 20^\circ}$

$= \dfrac{2(\frac{\sqrt{3}}{2}\cos 20^\circ+\frac{1}{2}\sin 20^\circ)-\sin 20^\circ}{\cos 20^\circ}$

$= \dfrac{\sqrt{3}\cos 20^\circ+\sin 20^\circ-\sin 20^\circ}{\cos 20^\circ}$

$= \sqrt{3}$

【例 2】计算：（1）$[2\sin 50^\circ+\sin 10^\circ(1+\sqrt{3}\tan 10^\circ)]\times\sqrt{2\sin^2 80^\circ}$；（2）$\dfrac{\sin 7^\circ+\cos 15^\circ\sin 8^\circ}{\cos 7^\circ-\sin 15^\circ\sin 8^\circ}$.

(1) $=(2\sin(60^\circ-10^\circ)+\sin 10^\circ+\sqrt{3}\frac{\sin^2 10^\circ}{\cos 10^\circ})\times\sqrt{2}\cos 10^\circ$

$=[2\times(\frac{\sqrt{3}}{2}\cos 10^\circ-\frac{1}{2}\sin 10^\circ)+\sin 10^\circ+\sqrt{3}\frac{\sin^2 10^\circ}{\cos 10^\circ})\times\sqrt{2}\cos 10^\circ$

$=(\sqrt{3}\cos 10^\circ \cancel{-\sin 10^\circ} \cancel{+\sin 10^\circ}+\sqrt{3}\frac{\sin^2 10^\circ}{\cos 10^\circ})\times\sqrt{2}\cos 10^\circ$

$=\sqrt{6}\cos^2 10^\circ+\sqrt{6}\sin^2 10^\circ$

$=\sqrt{6}$

(2) $= \dfrac{\sin(15-8)^\circ + \cos 15^\circ \sin 8^\circ}{\cos(15-7)^\circ - \sin 15^\circ \sin 8^\circ}$

$$= \frac{\sin 15 \cos 8^\circ - \cos 15^\circ \sin 8^\circ + \cos 15^\circ \sin 8^\circ}{\cos 15^\circ \cos 8^\circ + \sin 15^\circ \sin 8^\circ - \sin 15^\circ \sin 8^\circ}$$

$$= \frac{\sin 15^\circ \cos 8^\circ}{\cos 15^\circ \cos 8^\circ}$$

$$= \tan 15^\circ$$

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

$$= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \tan 45^\circ} = \frac{\sqrt{3} - 1}{1 + \sqrt{3}} = \frac{(\sqrt{3}-1)^2}{2} = 2 - \sqrt{3}$$

【例 3】$(1+\tan 1^\circ)(1+\tan 2^\circ)(1+\tan 3^\circ)\cdots(1+\tan 45^\circ)=$ $\underline{2^{23}}$.

$(1+\tan 1^\circ)(1+\tan 44^\circ)=1+\tan 1^\circ+\tan 44^\circ+\tan 1^\circ\cdot\tan 44^\circ$

$\because \tan 45^\circ=\tan(1^\circ+44^\circ)=\dfrac{\tan 1^\circ+\tan 44^\circ}{1-\tan 1^\circ\cdot\tan 44^\circ}=1$ $\quad\therefore \tan 1^\circ+\tan 44^\circ=1-\tan 1^\circ\cdot\tan 44^\circ$

$\therefore \tan 1^\circ+\tan 44^\circ+\tan 1^\circ\cdot\tan 44^\circ=1$ $\quad\therefore (1+\tan 1^\circ)(1+\tan 44^\circ)=2$

同理，$(1+\tan 2^\circ)(1+\tan 43^\circ)=2$，$(1+\tan 3^\circ)(1+\tan 42^\circ)=2$，$\cdots$

$(1+\tan 22^\circ)(1+\tan 23^\circ)=2$.

$\therefore$ 原式 $=\underbrace{2\times 2\times 2\times\cdots\times 2}_{22个}\times 2=2^{23}$