(Sum formulae)

1. $\sin(A+B) = \sin A\cos B + \cos A\sin B$

2. $\cos(A+B) = \cos A\cos B - \sin A\sin B$

ex1: Derive 2 from 1 or viceversa.

3. $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}$

ex2: Find out $\sin/\cos/\tan\,(A-B)$

4. Find $\sin 15°$ (straightforward formula application)

$\rightarrow \cos 75°, \sin 75°$, so, on...

5. $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B$

6. Note that

$\tan\left(\frac{\pi}{4}+\theta\right) = \dfrac{1+\tan\theta}{1-\tan\theta}$, $\tan(\pi/4-\theta) = \dfrac{1-\tan\theta}{1+\tan\theta}$

Using this ~~prove~~ solve for n,

$(1+\tan 1°)(1+\tan 2°)\ldots(1+\tan 45°) = 2^n$.

7. Prove that

$1 - \cot 23° = \dfrac{2}{1-\cot 22°}$

8. Express $\sin x + \cos x$ as sin of some angle

9. Prove,

$$\tan 20^\circ + \tan 40^\circ + \sqrt{3}\,\tan 20^\circ \tan 40^\circ = \sqrt{3}$$

10. Prove,

$$\tan 3A - \tan 2A - \tan A = \tan 3A \tan 2A \tan A$$

11. Prove, if A, B, C are the angles of a Δle,

$$\tan A + \tan B + \tan C = \tan A \tan B \tan C$$

This may appear as a mcq as:

If A, B, C (all non-zero and none of them are $\pi/2$) are angles of a Δle, then coefficient of x in the cubic equation who roots are $\cot A$, $\cot B$, $\cot C$ is ____ .

12. Derive a formula for

$\tan(A+B+C)$,

Using it or otherwise solve:

$x+y+z=\pi$, $\tan x \tan y = \overset{2}{\cancel{18}}$, $\tan y \tan z = 18$

Then $\tan y$ is ____ ?