③ P135

(1) $\sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$

[証明]

(左辺) $= \sin^4\theta - \cos^4\theta$

$= (\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)$

$= 1 \times (\sin^2\theta - \cos^2\theta)$

$= \sin^2\theta - \cos^2\theta$

$= (1 - \cos^2\theta) - \cos^2\theta$

$= 1 - 2\cos^2\theta$

$=$ (右辺)

$\therefore \quad \sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$

← $\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta = 1 - \cos^2\theta$

(2) $\tan^2\theta + (1 - \tan^4\theta)\cos^2\theta = 1$

[証明]

(左辺) $= \tan^2\theta + (1 - \tan^4\theta)\cos^2\theta$

$= \tan^2\theta + (1 - \tan^2\theta)(1 + \tan^2\theta)\cos^2\theta$

$= \tan^2\theta + (1 - \tan^2\theta) \cdot \frac{1}{\cos^2\theta} \cdot \cos^2\theta$

$= \tan^2\theta + (1 - \tan^2\theta)$

$= 1$

$=$ (右辺)

$\therefore \quad \tan^2\theta + (1 - \tan^4\theta)\cos^2\theta = 1$

← $1 + \tan^2\theta = \frac{1}{\cos^2\theta}$