

$$65 \quad \frac{\sin(180-\alpha)}{1-\cos(180-\alpha)} - \frac{\sin(180+\alpha)}{1+\cos(180+\alpha)} = \frac{2}{\sin(\alpha+360)}$$

$$\frac{\sin \alpha}{1+\cos \alpha} - \frac{\sin(-\alpha)}{1+\cos(-\alpha)} = \frac{2}{\sin \alpha}$$

$$\frac{\sin \alpha}{1+\cos \alpha} + \frac{\sin \alpha}{1+\cos \alpha} = \frac{2}{\sin \alpha}$$

$$\frac{\sin \alpha (1-\cos \alpha) + \sin \alpha (1+\cos \alpha)}{1-\cos^2 \alpha} = \frac{2}{\sin \alpha}$$

$$\frac{\sin \alpha - \sin \alpha \cos \alpha + \sin \alpha + \sin \alpha \cos \alpha}{\sin^2 \alpha} = \frac{2}{\sin \alpha}$$

$$\frac{2 \sin \alpha}{\sin^2 \alpha} = \frac{2}{\sin \alpha}$$

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$$\left. \begin{aligned} \sin \alpha &= \sin(180-\alpha) \\ -\cos \alpha &= \cos(180-\alpha) \\ \sin \alpha &= \sin(\alpha+360) \\ -\sin \alpha &= \sin(-\alpha) \\ \cos \alpha &= \cos(-\alpha) \end{aligned} \right\}$$

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

70  $\tan \alpha = a$

$$\frac{\sin \alpha}{\cos \alpha} = a \rightarrow \sin \alpha = a \cdot \cos \alpha$$

$$\frac{\sin \alpha - \cos \alpha}{\sin \alpha + \cos \alpha} = \frac{a \cos \alpha - \cos \alpha}{a \cos \alpha + \cos \alpha} = \frac{\cos \alpha (a-1)}{\cos \alpha (a+1)} = \frac{a-1}{a+1}$$

76  $\sin^2 \alpha \cos^2 \beta - \cos^2 \alpha \sin^2 \beta = \sin^2 \alpha - \sin^2 \beta$

$$\sin^2 \alpha \cos^2 \beta - \sin^2 \alpha = \cos^2 \alpha \sin^2 \beta - \sin^2 \beta$$

$$\sin^2 \alpha (\cos^2 \beta - 1) = \sin^2 \beta (\cos^2 \alpha - 1)$$

$$-\sin^2 \alpha \sin^2 \beta = -\sin^2 \beta \sin^2 \alpha$$

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$$\begin{aligned} \cos^2 \alpha - 1 &= -\sin^2 \alpha \\ \cos^2 \beta - 1 &= -\sin^2 \beta \end{aligned}$$

26  $\sin 2\alpha = \frac{2 \tan \alpha}{1 + \tan^2 \alpha}$

$$\sin 2\alpha (1 + \tan^2 \alpha) = 2 \tan \alpha$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}, \sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$2 \sin \alpha \cos \alpha + \frac{2 \sin \alpha \cos \alpha \sin^2 \alpha}{\cos^2 \alpha} = \frac{2 \sin \alpha}{\cos \alpha} \quad / \cdot \cos \alpha$$

$$2 \sin \alpha \cos^2 \alpha + 2 \sin^3 \alpha = 2 \sin \alpha$$

$$2 \sin \alpha (\cos^2 \alpha + \sin^2 \alpha) = 2 \sin \alpha$$

$$2 \sin \alpha = 2 \sin \alpha$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

36  $\frac{\sin 3\alpha}{\sin \alpha} = \frac{\sin(\alpha+2\alpha)}{\sin \alpha} = \frac{\sin \alpha \cos 2\alpha + \cos \alpha \sin 2\alpha}{\sin \alpha} = \frac{\sin \alpha \cos 2\alpha + \cos \alpha \cdot 2 \sin \alpha \cos \alpha}{\sin \alpha}$

$$\sin(\alpha+\beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$= \frac{\sin \alpha \cos 2\alpha}{\sin \alpha} + \frac{\cos \alpha \cdot 2 \sin \alpha \cos \alpha}{\sin \alpha} = \cos 2\alpha + 2 \cos^2 \alpha = 2 \cos^2 \alpha - 1 + 2 \cos^2 \alpha = 4 \cos^2 \alpha - 1$$

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