21.09.2021

1) $\cos^2(x) \cdot \tan^2(x) + \cos^2(x) = ?$

$\boxed{\cos^2(x) \neq \cos(x^2)}$ $\tan^2(x) = (\tan(x))^2$

$\tan x = \frac{\sin x}{\cos x}$ $\sin^2 x + \cos^2 x = 1$

$\cos^2(x) \cdot \left(\frac{\sin(x)}{\cos(x)}\right)^2 + \cos^2(x) =$ mit $\left(\frac{a}{b}\right)^r = \frac{a^r}{b^r}$

$= \cancel{\cos^2(x)} \cdot \frac{\sin^2(x)}{\cancel{\cos^2(x)}} + \cos^2(x) =$

$= \sin^2(x) + \cos^2(x) = \underline{\underline{1}};$

h) $1 - \sin(\alpha) \cdot \tan\left(\frac{\alpha}{2}\right)$

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

$1 - \cancel{\sin\alpha} \cdot \frac{1-\cos\alpha}{\cancel{\sin\alpha}}$

$1 - (1 - \cos\alpha) = 1 - 1 + \cos\alpha = \underline{\underline{\cos\alpha}}$

4. Leiten Sie mit Hilfe des Additionstheorems $\cos(\propto + \beta) = \cos(\alpha) * \cos(\beta) - \sin(\alpha) * \sin(\beta)$ die Gültigkeit der Beziehung

$$\cos(2 \propto) = 2 * cos^2(\propto) - 1$$

her!

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

$$\cos(\alpha+\beta) = \frac{1}{2}\left[\cancel{\cos(\alpha-\beta)} + \cos(\alpha+\beta)\right] - \frac{1}{2}\left[\cancel{\cos(\alpha-\beta)} - \cos(\alpha+\beta)\right]$$

$$\cos(\alpha+\beta) = \frac{1}{2} \cdot \left[\cos(\alpha+\beta) - (-\cos(\alpha+\beta))\right]$$

$$\cos(\alpha+\beta) = \frac{1}{2} \cdot (2 \cdot \cos(\alpha+\beta))$$

$\cos(\alpha +$

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

cos

$$\cos(\alpha+\beta) + \cos(\alpha-\beta) = 2 \cdot \cos\alpha \cdot \cos\beta \quad | -\cos(\alpha-\beta)$$

$$\cos(\alpha+\beta) = 2 \cdot \cos\alpha \cdot \cos\beta - \cos(\alpha-\beta)$$

$$2 \cdot \cos\alpha \cdot \cos\beta - \cos(\alpha-\beta) = \cos\alpha \cdot \cos\beta - \sin\alpha \cdot \sin\beta \quad | -\cos\alpha\cos\beta$$

$$\cos\alpha \cdot \cos\beta - \cos(\alpha-\beta) = -\sin\alpha \cdot \sin\beta$$ Formel 7.6.6 Nr.1

$$\cos\alpha \cdot \cos\beta - \cos(\alpha-\beta) = -\left(\frac{1}{2}(\cos(\alpha-\beta) - \cos(\alpha+\beta))\right)$$

$$\cos\alpha \cdot \cos\beta - \cos(\alpha-\beta) = -\frac{1}{2}\cos(\alpha-\beta) + \frac{1}{2}\cos(\alpha+\beta) \quad | +\frac{1}{2}\cos(\alpha-\beta)$$

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

Aufgabe 4

Annahme $\alpha = \beta$

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

$$\frac{\sin^2 x + \cos^2 x - \cos^2 x}{\sin x \cdot \cos x} = \frac{\sin^2 x}{\sin x \cdot \cos x} = \frac{\sin x}{\cos x} = \underline{\underline{\tan x}}$$

3) $$\frac{\boxed{\sin(x+y)} + \sin(x-y)}{\cos(x+y) + \cos(x-y)} =$$

Trigonometrische Formeln

$$\sin(A \pm B) = \sin A \cdot \cos B \pm \cos A \cdot \sin B$$
$$\cos(A \pm B) = \cos A \cdot \cos B \mp \sin A \cdot \sin B$$

$$\frac{\sin x \cdot \cos y + \cancel{\cos x \cdot \sin y} + \sin x \cdot \cos y - \cancel{\cos x \cdot \sin y}}{\cos x \cdot \cos y - \cancel{\sin x \cdot \sin y} + \cos x \cdot \cos y + \cancel{\sin x \cdot \sin y}} =$$

$$= \frac{2 \cdot \sin x \cdot \cos y}{2 \cdot \cos x \cos y} = \frac{\sin x}{\cos x} = \underline{\underline{\tan x}}$$

4)
$$\frac{1 - \cos(2x)}{\sin(2x)} =$$

$$\frac{1 - \cos^2 x + \sin^2 x}{2 \cdot \sin x \cdot \cos x}$$