

§ 7.3 DOUBLE ANGLE, HALF ANGLE FORMULAS # 73-76, 78, 81, 82

$$\begin{aligned}\underline{73.} \quad \cos(10x) &= \cos(2(5x)) \\ &= \cos^2(5x) - \sin^2(5x) \quad \checkmark\end{aligned}$$

$$\begin{aligned}\underline{74.} \quad \sin(8x) &= \sin(2(4x)) \\ &= 2 \sin(4x) \cos(4x) \quad \checkmark\end{aligned}$$

$$\begin{aligned}\underline{75.} \quad (\sin x + \cos x)^2 &= \sin^2 x + 2 \sin x \cos x + \cos^2 x \\ &= \underbrace{\sin^2 x + \cos^2 x}_1 + \underbrace{2 \sin x \cos x}_{\sin(2x)} \\ &= 1 + \sin(2x) \quad \checkmark\end{aligned}$$

$$\begin{aligned}\underline{76.} \quad \cos^4 x - \sin^4 x &= \underbrace{(\cos^2 x + \sin^2 x)}_1 (\cos^2 x - \sin^2 x) \\ &= \cos^2 x - \sin^2 x = \cos 2x \quad \checkmark\end{aligned}$$

$$\begin{aligned}
 \underline{78.} \quad \frac{1 - \cos 2x}{\sin 2x} &= \frac{1 - (1 - 2 \sin^2 x)}{2 \sin x \cos x} \\
 &= \frac{\cancel{2} \sin^2 x}{\cancel{2} \sin x \cos x} = \frac{\sin x}{\cos x} = \tan x \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 \underline{81.} \quad \frac{\sin 4x}{\sin x} &= \frac{2 \sin 2x \cos 2x}{\sin x} = \frac{2 (2 \cancel{\sin x} \cos x) \cos 2x}{\cancel{\sin x}} \\
 &= 4 \cos x \cos 2x \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 \underline{82.} \quad \frac{1 + \sin 2x}{\sin 2x} &= \frac{1 + 2 \sin x \cos x}{2 \sin x \cos x} \\
 &= \frac{1}{2 \sin x \cos x} + \frac{2 \sin x \cos x}{2 \sin x \cos x} \\
 &\qquad\qquad\qquad \underbrace{\hspace{10em}}_1
 \end{aligned}$$

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

$$= \frac{1}{2} \csc x \sec x + 1 \quad \checkmark$$