§7.3 Double Angle, Half Angle Formulas # 73-76, 78, 81, 82

73. $\cos(10x) = \cos(2(5x))$

$= \cos^2(5x) - \sin^2(5x)$ ✓

74. $\sin(8x) = \sin(2(4x))$

$= 2\sin(4x)\cos(4x)$ ✓

75. $(\sin x + \cos x)^2 = \sin^2 x + 2\sin x \cos x + \cos^2 x$

$= \underbrace{\sin^2 x + \cos^2 x}_{1} + \underbrace{2\sin x \cos x}_{\sin(2x)}$

$= 1 + \sin(2x)$ ✓

76. $\cos^4 x - \sin^4 x = \underbrace{(\cos^2 x + \sin^2 x)}_{1}(\cos^2 x - \sin^2 x)$

$= \cos^2 x - \sin^2 x = \cos 2x$ ✓

78. $\dfrac{1-\cos 2x}{\sin 2x} = \dfrac{1-(1-2\sin^2 x)}{2\sin x\cos x}$

$= \dfrac{2\sin^2 x}{2\sin x\cos x} = \dfrac{\sin x}{\cos x} = \tan x$ ✓

81. $\dfrac{\sin 4x}{\sin x} = \dfrac{2\sin 2x\cos 2x}{\sin x} = \dfrac{2(2\sin x\cos x)\cos 2x}{\sin x}$

$= 4\cos x\cos 2x$ ✓

82. $\dfrac{1+\sin 2x}{\sin 2x} = \dfrac{1+2\sin x\cos x}{2\sin x\cos x}$

$= \dfrac{1}{2\sin x\cos x} + \dfrac{2\sin x\cos x}{2\sin x\cos x}$

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

$= \dfrac{1}{2}\csc x\sec x + 1$ ✓