Verifying w/ Double & Half

1. $2\sin 0.6\cos 0.6 = \boxed{\sin 1.2}$

2. $2\sin 3\cos 3 = \boxed{\sin 6}$

3. $2\sin 2\cos 2 = \boxed{\sin 4}$

4. $\cos^2 0.45 - \sin^2 0.45 = \boxed{\cos 0.9}$

5. $2\cos^2 5 - 1 = \boxed{\cos 10}$

6. $1 - 2\sin^2 3 = \boxed{\cos 6}$

7. $2\sin\frac{\pi}{6}\cos\frac{\pi}{6} - \sin\left(2\cdot\frac{\pi}{6}\right) = \boxed{\sin\frac{\pi}{3}}$

8. $\cos^2\frac{\pi}{10} - \sin^2\frac{\pi}{10} = \cos\left(2\cdot\frac{\pi}{10}\right) = \boxed{\cos\frac{\pi}{5}}$

9. $1 + 2\sin\theta = (\sin\theta + \cos\theta)^2$

$$(\sin\theta + \cos\theta)^2 = \sin^2\theta + 2\sin\theta\cos\theta + \sin^2\theta$$
$$= \underbrace{\sin^2\theta + \cos^2\theta}_{1} + 2\sin\theta\cos\theta$$
$$= 1 + \sin 2\theta \quad \checkmark$$

10. $\sin 2\theta = 2\cot\theta\cdot\sin^2\theta$

$$2\cot\theta\sin^2\theta = 2\cdot\frac{\cos\theta}{\sin\theta}\cdot\sin^2\theta = 2\cos\theta\sin\theta$$
$$= \sin 2\theta \quad \checkmark$$

11. $\cos 2\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

$$\frac{1-\tan^2\theta}{1+\tan^2\theta} = \frac{1-\tan^2\theta}{\sec^2\theta} = \frac{1}{\sec^2\theta} - \frac{\tan^2\theta}{\sec^2\theta}$$

$$= \cos^2\theta - \frac{\frac{\sin^2\theta}{\cos^2\theta}}{\sec^2\theta} = \cos^2\theta - \frac{\frac{\sin^2\theta}{\cos^2\theta}}{\sec^2\theta} \cdot \frac{1}{\sec^2\theta}$$

$$= \cos^2\theta - \frac{\sin^2\theta}{\cos^2\theta} \cdot \cos^2\theta = \cos 2\theta \checkmark$$

12. $\sec^2\theta = \dfrac{2}{1+\cos 2\theta}$

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

$$= \frac{1}{\cos^2\theta} = \sec^2\theta \checkmark$$

13. $\dfrac{1-\cos 2\theta}{2} = \sin^2\theta$

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

$$= \sin^2\theta \checkmark$$

15. $\dfrac{\sin^2\theta + \cos^2\theta}{\sin^2\theta - \cos^2\theta} = -\sec 2\theta$

$$\frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta - \cos^2\theta} = \frac{1}{\sin^2\theta - \cos^2\theta} = \frac{1}{1 - \cos^2\theta - \cos^2\theta}$$

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

$$= -\sec 2\theta \checkmark$$

16. $\dfrac{(\sin\theta + \cos\theta)^2}{\sin 2\theta} = \csc 2\theta + 1$

$$\frac{(\sin\theta + \cos\theta)^2}{\sin 2\theta} = \frac{\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta}{2\sin\theta\cos\theta}$$

$$= \frac{(\sin^2\theta + \cos^2\theta) + 2\sin\theta\cos\theta}{2\sin\theta\cos\theta}$$

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

$$= \frac{1}{\sin 2\theta} + 1 = \csc 2\theta + 1 \checkmark$$