Q1.

(a) $2\csc 2t = \sec t \csc t$.

$$2\csc 2t = \frac{2}{\sin(2t)}$$

$$\sin(2t) = 2\sin t \cos t.$$

$$= \frac{2}{2\sin t \cos t} = \frac{1}{\sin t \cos t}.$$

But $\dfrac{1}{\sin t \cos t} = \sec t \csc t$

True

(b) $\cot^2\theta + \sec^2\theta = \tan^2\theta + \csc^2\theta$

$\cot^2\theta + \sec^2\theta$

$\sec^2\theta = 1 + \tan^2\theta$

$= 1 + \cot^2\theta + \tan^2\theta$.

$= 1 + \cot^2\theta = \csc^2\theta$.

$= \csc^2\theta + \tan^2\theta$

True.

(c) $\sin x \sin 2x + \cos x \cos 2x = \cos x$

$\sin x \sin 2x + \cos x \cos 2x = \cos x$.

Consider $\cos x = \cos(2x - x)$.

$$\cos(\theta \pm \phi) = \cos\theta \cos\phi \mp \sin\theta \sin\phi$$

$$\cos(2x - x) = \cos x \cos 2x + \sin x \sin 2x$$

True.