Part C

$\sin(4x) = 4 \cdot \sin(x) \cdot \cos(x) \cdot \cos(2x)$

$2\sin(2x)\cos(2x) = 4 \cdot \sin(x) \cdot \cos(x) \cdot \cos(2x)$

$2 \cdot 2 \cdot \sin(x) \cdot \cos(x) \cdot \cos(2x) = 4\sin(x) \cdot \cos(x) \cdot \cos(2x)$

$4 \cdot \sin(x) \cdot \cos(x) \cdot \cos(2x) = 4 \cdot \sin(x) \cdot \cos(x) \cdot \cos(2x)$

Part D

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

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

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

$\sin^2\theta \cdot \cos^2\theta = \sin^2\theta \cdot \cos^2\theta$

3 Part A

$\cot(x-20^\circ) = 1$

$\tan(x-20^\circ) = 1$

$x - 20^\circ = 45^\circ, 225^\circ$

$x = 65^\circ, 245^\circ$

Part B

$\cos(3x+\pi) = \frac{\sqrt{2}}{2}$ $\quad 3x = -135^\circ, 135^\circ$

$3x + \pi = 45^\circ, 315^\circ$ $\quad x = \cancel{-45^\circ}, 45^\circ, 315^\circ$

Part C

$\cos(3x) = \cos(5x) + \cos(x)$

$2\cos^3x - \cos x - 2\sin^2x\cos x = \cos 3x \cos 2x - \sin 3x \sin 2x + \cos x$

From 2, Part A

$2\cos^3x - \cos x - 2\sin^2x\cos x = (2\cos^3x - \cos x - 2\sin^2x\cos x)\cdot(2\cos^2x - 1) - (3\sin x - 4\sin^3x)(2\sin x\cos x) + \cos x$

$2\cos^3x - 2\cos x - 2\sin^2x\cos x = 4\cos^5x - 2\cos^3x - 4\sin^2x\cos^3x - 2\cos^3x + \cos x + 2\sin^2x\cos x - 6\sin^2x\cos x - 8\sin^4x\cos x$

$6\cos^3x - 3\cos x + 2\sin^2x\cos x = 4\cos^5x - 4\sin^2x\cos^3x - 8\sin^4x\cos x$

$\cos x(6\cos^2x - 3 + 2\sin^2x) = \cos x(4\cos^4x - 4\sin^2x\cos^2x - 8\sin^4x)$

$\cos x = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$