

$$\begin{aligned}\sin 2v &= \sin(v) \\ \Leftrightarrow 2\sin(v)\cos(v) &= \sin(v) \\ \Leftrightarrow \sin(v) &= 0, \cos(v) = \frac{1}{2}\end{aligned}$$

a)

$$\begin{aligned}\sin(v) &= 0 \Leftrightarrow v = \pi n \\ \cos(v) &= \frac{1}{2} \Leftrightarrow \pm \frac{\pi}{3} + 2\pi n \\ n &\in \mathbb{Z}\end{aligned}$$

$$\begin{aligned}\cos(4v) + \cos(2v) + 1 &= 0 \\ \Leftrightarrow 2\cos^2(2v) - 1 + \cos(2v) + 1 &= 0 \\ \Leftrightarrow 2\cos^2(2v) + \cos(2v) &\Leftrightarrow \cos(2v)(2\cos(2v) + 1) = 0 \\ \Leftrightarrow \cos(2v) &= 0, \cos(2v) = \frac{-1}{2}\end{aligned}$$

b)

$$\begin{aligned}\cos(2v) &= 0 \Leftrightarrow 2v = \frac{\pm\pi}{2} + 2\pi n \Leftrightarrow v = \frac{\pm\pi}{4} + \pi n \\ \cos(2v) &= \frac{-1}{2} \Leftrightarrow v = \frac{\pm\pi}{3} + \pi n \\ n &\in \mathbb{Z}\end{aligned}$$

$$\begin{aligned}4\sin^2(v) - 3 &= 0 \\ \Leftrightarrow \sin^2(v) &= \frac{3}{4} \Leftrightarrow \sin(v) = \frac{\pm\sqrt{3}}{2}\end{aligned}$$

c)

$$\begin{aligned}\sin(v) &= \sin(\pi - v) \\ \sin(v) &= \frac{\sqrt{3}}{2} \Leftrightarrow v = \frac{\pi}{3} \\ \Leftrightarrow v &= \frac{\pi}{3} + 2\pi n \text{ och } v = 2\frac{\pi}{3} + 2\pi n \\ \sin(v) &= \frac{-\sqrt{3}}{2} \Leftrightarrow v = \frac{-\pi}{3} + 2\pi n \text{ och } v = 4\frac{\pi}{3} + 2\pi n \\ n &\in \mathbb{Z}\end{aligned}$$

$$\begin{aligned}2\cos^2(v) - \sin(v) &= 2 \\ \Leftrightarrow 2(1 - \sin^2(v)) - \sin(v) &= 2 \\ \Leftrightarrow 2\sin^2(v) + \sin(v) &= 0 \Leftrightarrow \sin(v) = 0 \text{ el. } -\frac{1}{2}\end{aligned}$$

d)

$$\begin{aligned}\sin(v) &= 0 \Leftrightarrow v = \pi n \\ \sin(v) &= \frac{-1}{2} \Leftrightarrow v = \frac{-\pi}{6} + 2\pi n \text{ el. } v = \pi - (\frac{-\pi}{6}) + 2\pi n \\ n &\in \mathbb{Z}\end{aligned}$$

