

a) done

b) done

$$c) \frac{2\pi}{3} \Rightarrow \frac{2\pi}{3} \times \frac{0,02}{2\pi} \approx 6,67 \text{ms}$$

$$V_c = \sqrt{2} \cdot \sqrt{3} \cdot 120 = 293,94$$

$$d) V_{av} = \frac{1}{\pi} \times \int_0^{\pi} V(\theta) d\theta ; A = \sqrt{2} \cdot 120$$

$$= \frac{1}{\pi} \left[ \int_0^{\frac{\pi}{6}} A \cdot \sin\left(\theta - \frac{4\pi}{3}\right) + \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta) + \int_{\frac{5\pi}{6}}^{\frac{3\pi}{2}} A \cdot \sin\left(\theta - \frac{2\pi}{3}\right) + \int_{\frac{3\pi}{2}}^{2\pi} A \cdot \sin\left(\theta - \frac{4\pi}{3}\right) \right]$$

$$\underline{V_{av}} = 3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta) = 140,3454 \text{ [V]}$$

$$\underline{V_{rms}} = \sqrt{\frac{1}{\pi}} \times \sqrt{\int_0^{\pi} (V(\theta))^2 d\theta} ; A = \sqrt{2} \cdot 120$$

$$= \sqrt{\frac{1}{\pi}} \times \sqrt{\int_0^{\frac{\pi}{6}} (A \cdot \sin(\theta - \frac{4\pi}{3}))^2 + \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \sin(\theta))^2 + \int_{\frac{5\pi}{6}}^{\frac{3\pi}{2}} (A \cdot \sin(\theta - \frac{2\pi}{3}))^2 + \int_{\frac{3\pi}{2}}^{2\pi} (A \cdot \sin(\theta - \frac{4\pi}{3}))^2}$$

$$\approx 142,668 \text{ [V]}$$

$$c.a) \sqrt{127890,1659} \approx 357,617$$

$$\sqrt{\frac{1}{2\pi}} \times 357,617 = 142,668 \text{ [V]}$$

$$\underline{V_{rms}} = \sqrt{3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \cdot \sin(\theta))^2 d\theta} = 142,668679$$

$$\sqrt{\frac{20354,35207}{2}} = 142,668 \text{ [V]}$$