

$$\tilde{N}(l) = N(l) \cdot i$$

$$N_{\max}(l) = \frac{W}{2} = \frac{\frac{N}{6} \cdot 1}{2} = \frac{N}{12}$$

$$b) \quad L_{asas} = \frac{\mu_0 r_0 l}{8} \int_0^{2\pi} [N_a(l)]^2 dl$$

$$= \frac{\mu_0 r_0 l}{8} \cdot 4 \cdot \left[ \int_0^{\frac{\pi}{6}} \left[ \frac{N}{12} l \right]^2 dl + \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \left[ \frac{N}{12} \right]^2 dl \right]$$

$$= \frac{4 \mu_0 r_0 l}{8} \left[ \frac{N^2}{4 \pi^2} \cdot \frac{l^3}{3} \Big|_{l=0}^{\frac{\pi}{6}} + \frac{N^2}{144} l \Big|_{l=\frac{\pi}{6}}^{\frac{\pi}{2}} \right]$$

$$= \frac{4 \mu_0 r_0 l}{8} N^2 \left[ \frac{1}{4 \pi^2} \cdot \frac{\pi^3}{648} + \frac{1}{144} \cdot \frac{\pi}{3} \right]$$

$$= \frac{\mu_0 r_0 l}{8} N^2 \frac{7\pi}{648}$$

$$c) \quad N_{a1} = \frac{1}{\pi} \int_0^{2\pi} N_a(l) \sin l \, dl = \frac{4}{\pi} \left[ \int_0^{\frac{\pi}{6}} \frac{N}{2\pi} l \sin l \, dl + \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \frac{N}{12} \sin l \, dl \right]$$

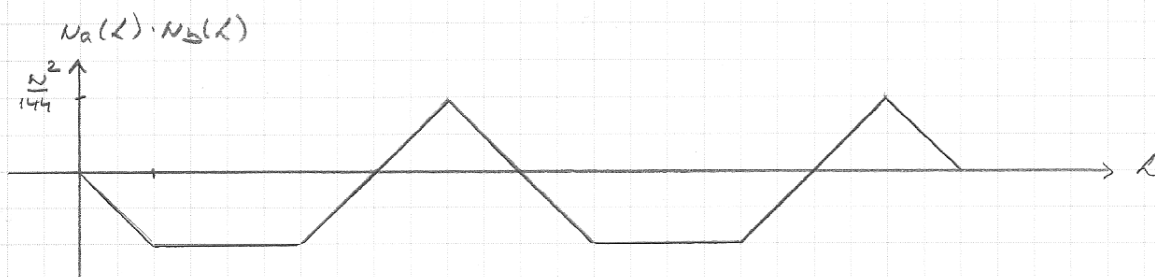
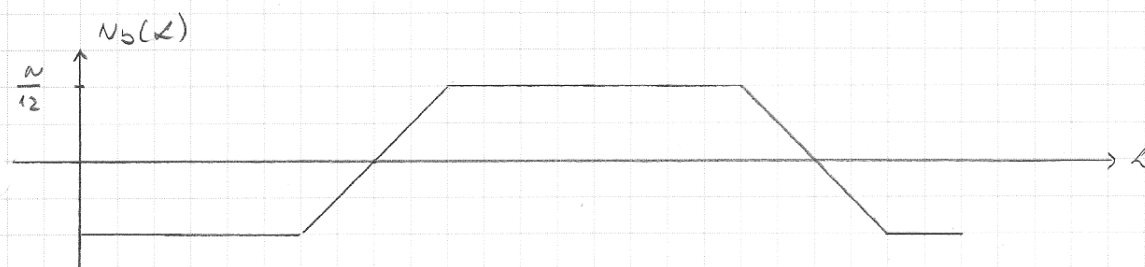
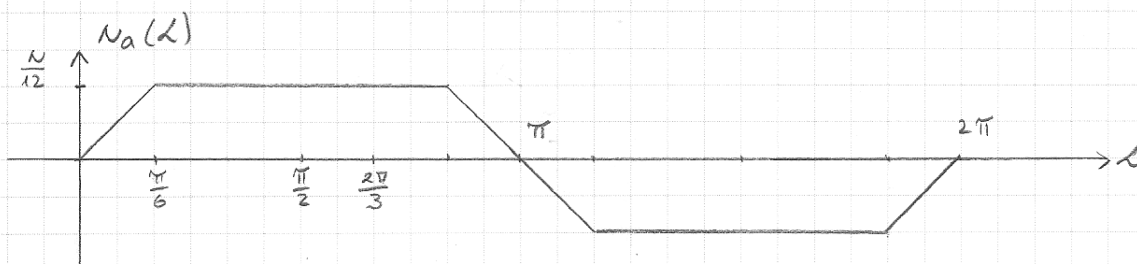
$$= \frac{4}{\pi} \left[ \frac{N}{2\pi} (\sin l - l \cos l) \Big|_{l=0}^{\frac{\pi}{6}} - \frac{N}{12} \cos l \Big|_{l=\frac{\pi}{6}}^{\frac{\pi}{2}} \right]$$

$$= \frac{N}{\pi^2}$$

$$L_{asas1} = \frac{\mu_0 r_0 l}{8} \int_0^{2\pi} [N_{a1}(l)]^2 dl = \frac{\mu_0 r_0 l}{8} \int_0^{2\pi} \left[ \frac{N}{\pi^2} \sin l \right]^2 dl$$

$$= \frac{N^2}{\pi^3} \frac{\mu_0 r_0 l}{8}$$

$$d) L_{asbs} = \frac{\mu_0 r_0 l}{8} \int_0^{2\pi} N_a(k) \cdot N_b(k) dk$$



$$L_{asbs} = \frac{\mu_0 r_0 l}{8} \cdot 2 \int_0^{\pi/3} \frac{-N^2}{144} dk = -\frac{N^2}{216} \pi \frac{\mu_0 r_0 l}{8}$$