5.8 a)
$$\| \, |F(e^{j\omega T})|^2 \, \|_p = \sqrt[p]{\frac{1}{2\pi} \int_0^{\pi} \left| \, |F(e^{j\omega T})|^2 \right|^p d\omega T} =$$

$$= \sqrt[p]{\frac{1}{2\pi} \int_0^{\pi} |F(e^{j\omega T})|^{2p} \, d\omega T} =$$

$$= \left(\sqrt[2p]{\frac{1}{2\pi} \int_0^{\pi} |F(e^{j\omega T})|^{2\mathrm{p}} \, d\omega T} \right)^2 = \| F(e^{j\omega T}) \|_{2p}^2$$

b) We have:

$$\| F(e^{j\omega T}) \, G(e^{j\omega T}) \|_p = \sqrt[p]{\frac{1}{2\pi} \int_{-\pi}^{\pi} |F(e^{j\omega T}) \, G(e^{j\omega T})|^p \, d\omega T} \leq$$

$$\leq \sqrt[p]{\frac{1}{2\pi} \int_{-\pi}^{\pi} |F(e^{j\omega T})|_{\max}{}^p \, |G(e^{j\omega T})|^p \, d\omega T} \leq$$

$$\leq |F(e^{j\omega T})|_{\max} \sqrt[p]{\frac{1}{2\pi} \int_{-\pi}^{\pi} |G(e^{j\omega T})|^p \, d\omega T} \leq$$

$$\leq \|F(e^{j\omega T})\|_\infty \, \|G(e^{j\omega T})\|_p \quad , \quad \mathrm{p} > 1$$

Hence, $\| F(e^{j\omega T}) \, G(e^{j\omega T}) \|_p \leq \|F(e^{j\omega T})\|_\infty \, \|G(e^{j\omega T})\|_p \quad , \; \mathrm{p} > 1$