Example

(i) Show that $\left(2+e^{i\theta}\right)\left(2+e^{-i\theta}\right)=5+4\cos\theta$.

(ii) Let $S=\frac{\sin\theta}{2}-\frac{\sin 2\theta}{2^2}+\frac{\sin 3\theta}{2^3}-\frac{\sin 4\theta}{2^4}+.....$

By considering $C-iS$ where $C=1-\frac{\cos\theta}{2}+\frac{\cos 2\theta}{2^2}-\frac{\cos 3\theta}{2^3}+\frac{\cos 4\theta}{2^4}-...$,

show that $S=\frac{2\sin\theta}{5+4\cos\theta}$.