

STEP III, 2009, Q6

- 6 Show that $|e^{i\beta} - e^{i\alpha}| = 2 \sin \frac{1}{2}(\beta - \alpha)$ for $0 < \alpha < \beta < 2\pi$. Hence show that

$$|e^{i\alpha} - e^{i\beta}| |e^{i\gamma} - e^{i\delta}| + |e^{i\beta} - e^{i\gamma}| |e^{i\alpha} - e^{i\delta}| = |e^{i\alpha} - e^{i\gamma}| |e^{i\beta} - e^{i\delta}|,$$

where $0 < \alpha < \beta < \gamma < \delta < 2\pi$.

Interpret this result as a theorem about cyclic quadrilaterals.



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