



STEP III, 2005, Q1

- 1 Show that $\sin A = \cos B$ if and only if $A = (4n + 1)\frac{\pi}{2} \pm B$ for some integer n .

Show also that $|\sin x \pm \cos x| \leq \sqrt{2}$ for all values of x and deduce that there are no solutions to the equation $\sin(\sin x) = \cos(\cos x)$.

Sketch, on the same axes, the graphs of $y = \sin(\sin x)$ and $y = \cos(\cos x)$. Sketch, not on the previous axes, the graph of $y = \sin(2 \sin x)$.



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