7 A curve has equation $y = x\cos x$.

(a) Find $\frac{\mathrm{d}y}{\mathrm{d}x}$. [2]

(b) Find the equation of the normal to the curve at the point where $x = \pi$, giving your answer in the form $y = mx + c$. [4]

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(c) Using your answer to **part (a)**, find the exact value of $\int_0^{\frac{\pi}{6}} x \sin x \, \mathrm{d}x$. [5]