Exercise 2

Paper 1 style · No calculator

2 6 marks SL 5.6 ●●○ Typical

Let $g(x) = \dfrac{e^{2x}}{x+1}$, for $x \neq -1$.

(a) Show that $g'(x) = \dfrac{(2x+1)\,e^{2x}}{(x+1)^2}$. **[3]**

(b) Find the exact coordinates of the point on the graph of g at which the tangent is horizontal. **[3]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

attempt at the quotient rule — **M1**

$g'(x) = \dfrac{2e^{2x}(x+1) - e^{2x} \times 1}{(x+1)^2}$ — **A1**

$= \dfrac{e^{2x}(2x+2-1)}{(x+1)^2}$ — **A1**

$= \dfrac{(2x+1)\,e^{2x}}{(x+1)^2}$ — **AG**

Total 3 marks

Note $\left(e^{2x}\right)' = 2e^{2x}$: without the 2, A0 and the given answer cannot be reached.

MARKSCHEME (b)

$g'(x) = 0;\ e^{2x} > 0$, so $2x + 1 = 0$ — **M1**

$x = -\dfrac{1}{2}$ — **A1**

$g\left(-\dfrac{1}{2}\right) = \dfrac{e^{-1}}{\frac{1}{2}} = 2e^{-1}$: $\left(-\dfrac{1}{2}, \dfrac{2}{e}\right)$ — **A1**

Total 3 marks