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$$\begin{aligned}f(x) &= ax + b + \frac{c}{x} \text{ donc } f'(x) = a - \frac{c}{x^2} \\f'(3) &= a - \frac{c}{3^2} = a - \frac{c}{9} = 0 \Leftrightarrow a = \frac{c}{9} \Leftrightarrow c = 9a \\f(1) &= a \times 1 + b + \frac{c}{1} = a + b + c = -9 \\f(3) &= a \times 3 + b + \frac{c}{3} = 3a + b + \frac{c}{3} = -5\end{aligned}$$

$$\begin{aligned}c &= 9a \Leftrightarrow a = -1 \\6a + b &= -5 \Leftrightarrow c = -9 \\10a + b &= -9 \Leftrightarrow b = 1\end{aligned}$$

$$f(x) = -x + 1 - \frac{9}{x}$$