8b

$$\longrightarrow 2\int_0^b e^{-x}\,dx = -2e^{-x}\Big|_0^b$$

$$\langle L_0, L_2\rangle = \lim_{b\to\infty}\Big[-e^{-x}\Big|_0^b + 2\Big[-xe^{-x}\Big|_0^b - e^{-x}\Big|_0^b\Big] + \cdots$$

$$\cdots - 4\Big[-xe^{-x}\Big|_0^b - e^{-x}\Big|_0^b\Big] - 2e^{-x}\Big|_0^b\Big] = 0$$

$$= \lim_{b\to\infty}\Big[-e^{-b} + 1 + 2\Big[-be^{-b} + 0 - e^{-b} + 1\Big] + \cdots$$

$$\cdots - 4\Big[-be^{-b} + 0 - e^{-b} + 1\Big] - 2e^{-b} + 2\Big] = 0$$

$$\left\{ \lim_{b\to\infty} -be^{-b} = \lim_{b\to\infty} \frac{-b}{e^{b}} \underset{\text{RULE}}{\overset{\text{L'H's}}{=}} \lim_{b\to\infty} -\frac{1}{e^{b}} = 0 \right\}$$