Q.1: Expand $f(x) = 3x$ in a Fourier Bessel series using the boundary condition

$$J_1(3\alpha) + \alpha J'_1(3\alpha).$$

(Hint: Use $c_i = \frac{2\alpha_i^2}{(\alpha_i^2 b^2 - n^2 + h^2) J^2_n(\alpha_i b)} \int_0^b x J_n(\alpha_i x) f(x) dx$ when $\alpha_i$ are defined by $hJ_n(ab) + \alpha b J'_n(ab) = 0$. )
Q.2: Find first three terms of Fourier Legendre series of \( f(x) = e^{-x}, \ -1 < x < 1 \).

Hint: Use \( c_n = \frac{2n+1}{2} \int_{-1}^{1} f(x) P_n(x) \, dx \)