(1) Find the first three non-zero terms in the Fourier-Legendre expansion of

\[ f(x) = \begin{cases} 
0 & -1 < x < 0 \\
1 & 0 \leq x < 1.
\end{cases} \]
(2) Show that $y_1(x) = x^3$ and $y_2(x) = x^2 + 1$ are orthogonal on $[-1, 1]$. Find values $a$ and $b$ such that both $y_1(x)$ and $y_2(x)$ are orthogonal to $y_3(x) = ax + bx^2 + x^3$. 
(3) Find the eigenvalues and eigenfunctions of the boundary value problem:

\[ y'' + y' + \lambda y = 0; \quad y(0) = 0, \quad y(2) = 0. \]