Note that is a non orthogonal basis in L2[-1,1]. You have to

1. Obtain orthonormal bases from using Gram Schmidt orthogonalization algorithm, which leads to construction of Legendre polynomials. (On paper)
2. Approximate using first 2 Legendre polynomials. (On paper)
3. Investigate the key points of difference with respect of 2nd order Taylor series approximation of .
4. Write a python function which takes N as argument and implements Legendre N-th polynomial.