

Problem: Approximate the function $x(t) = e^t$ over the interval $(0, 1)$ using the second order polynomial.

- a. From the set of linearly independent function, $[1, t, t^2]$, form an orthonormal set of functions. The inner product is defined as $\langle f(t), g(t) \rangle = \int_0^1 f(t)g(t)dt$.
- b. Based on this set of orthonormal functions, fit the best approximation in the least square error sense, that is minimize the norm of the error between the function $x(t)$ and its approximation.

...would it be best to use Taylor Series? Please show me the steps so that I may understand how this problem would be derived. Thanks!