Problem 4: Given that $x^7 + 1 = (x + 1) \cdot (x^3 + x + 1) \cdot (x^3 + x^2 + 1)$, determine the generator polynomial for a cyclic code of length 14 and dimension 10, if such a code exists. Show your work leading to the answer.

Notice we get the degree of the generator polynomial is $t = 14 - 10 = 4$. So we gave two choices for the generator polynomial:

$$g(x) = (x^3 + x^2 + 1)(x + 1) \text{ or } (x^3 + x + 1)(x + 1)$$

$$g(x) = x^4 + x^2 + x + 1 \text{ or } x^4 + x^3 + x^2 + 1$$