experimental mathematics with MAPLE

Help with exercises for chapter 7

Exercise 7.1. First, verify how the formula works in a specific example, where p has degree 2, and q has degree 3. Second, repeat the same for a generic polynomials of degree 2 and 3, respectively, i.e., $p = a_0 + a_1 x + a_2 x^2$, etc. Finally, attempt the general proof.

Exercise 7.2. Proceed as for exercise 7.1.

Exercise 7.4. There are six common divisors.

Exercise 7.6. The difficulty is understanding the question. The sequence $g_0, g_1, g_2, \ldots$ is a sequence of polynomials. Assuming such sequence is available, (it isn't, yet), we must test its elements for reducibility, one by one, until we find a polynomial that is reducible (where is reducibility defined in the book?). The position of this polynomial in the sequence (that is, its subscript) is the desired answer.

First, we do some calculations by hand. We have $g_0 = x$, and $g_1 = 1 + x \cdot x = 1 + x^2$. Is g_0 reducible? If not, is g_1 reducible? (You may need Maple at this point.) Compute g_2 by hand, and check again reducibility with Maple.

Finally, construct the sequence with Maple, using the usual procedure for recursive sequences (page 134).

Exercise 7.10. Part (e) may require some brute-force intervention.