Quadratic Algorithm

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The seven parts were assigned 2,1,3,2,2,2,3,3 for a total of 16 points.

Two observations:
The simplest answer to part six was to apply the algorithm to \((ax + b)(cx + d) = acx^2 + (ac + bd)x + abcd\) (since we only expect the algorithm to work when the polynomial is in such a form). But you have to be careful to see where you use the hypothesis that \(ac, ac + bd\) and \(abcd\) are relatively prime.

Here is a simple proof of part 7. The roots of \(a + by + cy^2\) are the reciprocals of the roots of \(ax + bx + c\). (Divide the second equation by \(x^2\) and replace \(x\) by \(1/y\).) Applying the quadratic formula to \(a + by + cy^2\) gives the reciprocal of the answer asked for. We are done.