

## Answer on Question #44364 – Math - Abstract Algebra

### Problem

Find the gcd of  $x^2+6x+1$  and  $x^2+3$  in  $\mathbb{Z}_7[x]$ .

### Solution

$$\begin{aligned}x^2 + 6x + 1 &= (x^2 + 3) \cdot 1 + (6x - 2) \\ \gcd(x^2 + 6x + 1, x^2 + 3) &= \gcd(6x - 2, x^2 + 3) \\ x^2 + 3 &\equiv (6x - 2)(6x + 2) + 0 \text{ (in } \mathbb{Z}_7[x]). \\ \gcd(6x - 2, x^2 + 3) &= 6x - 2\end{aligned}$$

### Answer

$$\gcd(x^2 + 6x + 1, x^2 + 3) = 6x - 2$$