CS 6001 Homework 3

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1 Problem 1

$$(9x^2 + 3x + 5)/(7x + 3)$$

$$\begin{aligned} 9/7 &= 9 * 7^{-1} \\ 1 &= 7 * 8 \ mod\ 11 \\ 7^{-1} &= 8 \\ 9 * 8 \ mod\ 11 &= 6 \end{aligned}$$

The first term is $6x$.

$$\begin{aligned} In\ GF(11): & \\ (7x + 3) * 6x &= 9x^2 + 7x \\ -4^{-1} &= 3 \\ (9x^2 + 3x + 5) - (9x^2 + 7x) &= 3x + 5 \end{aligned}$$

$$\begin{aligned} 3/7 &= 3 * 7^{-1} \\ 3/7 &= 3 * 8 \ mod\ 11 \\ 3/7 &= 2 \end{aligned}$$

$(9x^2 + 3x + 5)/(7x + 3) = 6x + 2$

2 Problem 2

Division

$(x^5 + x^3 + x^2 + x + 1)\ /\ (x^2 + x + 1)$

$$
\begin{array}{r|l}
 & x^3 - x^2 + x + 1 \\
\hline
x^2 + x + 1 & x^5 + x^3 + x^2 + x + 1 \\
 & \underline{-x^5 - x^4 - x^3} \\
 & \quad -x^4 + x^2 \\
 & \quad \underline{x^4 + x^3 + x^2} \\
 & \quad\quad x^3 + 2x^2 + x \\
 & \quad\quad \underline{-x^3 - x^2 - x} \\
 & \quad\quad\quad x^2 + 1 \\
 & \quad\quad\quad \underline{-x^2 - x - 1} \\
 & \quad\quad\quad\quad -x
\end{array}
$$

$= x^3 - x^2 + x + 1,\ R\ -x$