

CS 6001 Homework 3

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1 Problem 1

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

$$\begin{array}{r} 6x \quad + 1 \quad R \ 2 \\ 7x+3 \) \ 9x^2 \ + 3x \ + 5 \\ \underline{- \quad 9x^2 \ + 7x} \\ 7x \ + 5 \\ \underline{- \quad 7x \ + 3} \\ 2 \end{array}$$

$$(9x^2 + 3x + 5)/(7x + 3) = 6x + 1, \ R \ 2$$

2 Problem 2

2.1 Addition

$$\begin{aligned} (x^5 + x^3 + x^2 + x + 1) + (x^2 + x + 1) \\ = x^5 + x^3 \end{aligned}$$

2.2 Subtraction

$$\begin{aligned} (x^5 + x^3 + x^2 + x + 1) - (x^2 + x + 1) \\ = x^5 + x^3 \end{aligned}$$

2.3 Multiplication

$$(x^5 + x^3 + x^2 + x + 1) * (x^2 + x + 1)$$

$$\begin{aligned} x^5 + x^3 + x^2 + x + 1 * x^2 &= x^7 + x^5 + x^4 + x^3 + x^2 \\ x^5 + x^3 + x^2 + x + 1 * x &= x^6 + x^4 + x^3 + x^2 + x \\ x^5 + x^3 + x^2 + x + 1 * 1 &= x^5 + x^3 + x^2 + x + 1 \end{aligned}$$

$$\begin{array}{cccccccc}
 x^7 & & + x^5 & + x^4 & + x^3 & + x^2 & & \\
 & + x^6 & & + x^4 & + x^3 & + x^2 & + x & \\
 & & + x^5 & & + x^3 & + x^2 & + x & + 1 \\
 = x^7 + x^6 + x^3 + x^2 + 1
 \end{array}$$

2.4 Division

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

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & & x^3 & + x^2 & + x & + 1 & R\ x \\
 x^2 + x + 1 & \overline{) } & x^5 & & + x^3 & + x^2 & + x & + 1 \\
 & - & x^5 & + x^4 & + x^3 & & & \\
 & & & x^4 & & + x^2 & + x & + 1 \\
 & & - & x^4 & + x^3 & + x^2 & & \\
 & & & & x^3 & & + x & + 1 \\
 & & & & - & x^3 & + x^2 & + x \\
 & & & & & x^2 & & + 1 \\
 & & & & & - & x^2 & + x & + 1 \\
 & & & & & & & x
 \end{array} \\
 = x^3 + x^2 + x + 1, R\ x
 \end{array}$$