Homework #: hw04
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Theory Problems

1.) GF(11)

a. $(8x^4 + 7x^3 + 2x^2 + 10) + (9x^4 + 6x^3 + x + 7)$

$(17 \% 11)x^4 + (13 \% 11)x^3 + 2x^2 + x + (17 \% 11)$

$\boxed{6x^4 + 2x^3 + 2x^2 + x + 6}$

b.) $(3x^3 + 4x + 3) \times (2x^3 + x^2 + 9x + 7)$

$6x^6 + 8x^4 + 6x^3 + 3x^5 + 4x^3 + 3x^2 + (27 \% 11)x^4 + 36x^2 + 27x$

$+ \ 21x^3 + 28x + 21$

$6x^6 + 3x^5 + 35x^4 + 31x^3 + 39x^2 + 55x + 21$

$\boxed{6x^6 + 3x^5 + 2x^4 + 9x^3 + 6x^2 + 10}$

c.)

$$\begin{array}{r|l} & 4x^2 + 6x + 5 \\ \hline 2x^3 + 4x^2 + 3 & 8x^5 + 6x^4 + 2x^3 + x^2 + 6x \\ & -8x^5 - 5x^4 - x^2 \\ & \quad x^4 + 2x^3 + 6x \\ & \quad -x^4 - 2x^3 - 7x \\ & \quad\quad -x \\ & \quad\quad +10x \end{array}$$

$\boxed{4x^2 + 6x + \frac{10x}{2x^3 + 4x^2 + 3}}$

2.) $GF(2^3)$

a. $(x^2+x+1)\,x(x+1)$

$x^3+x^2+x+x^2+x+1$

x^3+1

$$x^3+1 \;\overline{)\; x^3+x+1 \;}\;\; 1$$

$$-x^3 \quad -1$$

$$x$$

$$1+\frac{x}{x^3+x+1}$$

$x^3+1 \;\%\; x^3+x+1 = \boxed{x}$

b. $(x+1)-(x^2+x+1)$ same as xor

$\boxed{x^2}$

c. $x^2+x+1 \;\overline{)\; x^2+1 \;}\;\; 1$

$$-x^2-x-1$$

$$x$$

$$\boxed{1+\frac{x}{x^2+1}}$$