1.

a) $(8x^4 + 17x^3 + 2x^2 + 10) + (9x^4 + 6x^3 + x + 17)$

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

$= (17 \bmod 11)x^4 + (13 \bmod 11)x^3$
$+ (2 \bmod 11)x^2 + (1 \bmod 11)x + 17 \bmod 11$

$= 6x^4 + 2x^3 + 2x^2 + x + 6$

b)
$(6x^6 + 3x^5 + 55x^4 + 31x^3 + 30x^2 + 55x + 21) \bmod 11$

$= 6x^6 + 3x^5 + 2x^4 + 9x^3 + 6x^2 + 10$

c) $\cdot \dfrac{9x}{2(2x^3 + 4x^2 + 3)} + \dfrac{x}{2} + 4x^2$

$= (8x^5 + 16x^4 + 12x^2 + x^4 + 2x^3 + \dfrac{3x}{2}) \bmod 11$

$+ (\dfrac{9}{2}x) \bmod 11$

$= 8x^5 + 6x^4 + 2x^3 + x^2 + 6x$

2.

a)
$$x^3 + 2x^2 + 2x + 1 = x^3 + 1 \qquad (GF(2) \Rightarrow 2 \equiv 0)$$

b) $(x^2+1) - (x^2+x+1)$
$$= -x = x \qquad (GF(2), \; 1 \equiv -1)$$

c)
$$\frac{x^2+x+1}{x^2+1} = \frac{x^4+1}{x^2+1} = \frac{x^4+2x+1}{x^2+1}$$

$$= \frac{(x^2+1)^2}{x^2+1} = x^2+1 \qquad (2 \equiv 0)$$