Assignment 11

7.3

2) $f(128) = 2f(64) + 2 = 254$ **254**

$f(64) = 2f(32) + 2 = 126$

$f(32) = 2f(16) + 2 = 62$

$f(16) = 2f(8) + 2 = 30$

$f(8) = 2f(4) + 2 = 14$

$f(4) = 2f(2) + 2 = 6$

$f(2) = 2f(1) + 2 = 2$

$f(1) = 0$

8) a) $f(2) = 2f(1) + 3 =$ **13**

b) $f(8) = 2f(4) + 3 =$ **61**

$f(4) = 2f(2) + 3 = 29$

c) $f(64) = 2f(32) + 3 =$ **509**

$f(32) = 2f(16) + 3 = 253$

$f(16) = 2f(8) + 3 = 125$

d) $f(1024) = 2f(512) + 3 =$ **8189**

$f(512) = 2f(256) + 3 = 4093$

$f(256) = f(128) + 3 = 2045$

$f(128) = 2f(64) + 3 = 1021$

10) $f(2^0) = f(1) = 1$, $f(2^1) = f(2) = f(1) + 1 = 2$,

$f(2^2) = f(4) = f(2) + 1 = 3$, $f(2^3) = f(8) = f(4) + 1 = 4$

$f(2^k) = f(2^{k-1}) + 1$, $f(2^0) = 1$

$\boxed{f(2^k) = k + 1}$

14) $r(2^1) = 2/2 = 1$, 1
$r(2^2) = 4/2 = 2/2 = 1$, 2
$r(2^3) = 8/2 = 4/2 = 2/2 = 1$, 3

$$r_n = r_{n/2} + 1, \quad n = 2^k$$

16) $r_2 k = K$

$$f(x) = \frac{a}{1-r}$$

7.4

2) $1 + 4x + 16x^2 + 64x^3 + 256x^4$ $\quad a = 1 \quad r = 4x \quad n = 4$

$$f(x) = \frac{1}{1-4x}$$

4) a) $-1, -1x, -1x^2, -1x^3, -1x^4, -1x^5, -1x^6, 0x^7, 0x^8, 0x^9$

$$\frac{x^7 - 1}{x - 1}$$

b) $1 + 3x + 9x^2 + 27x^3$

$$\frac{1}{1 - 3x}$$

c) $0 + 0x + 3x^2 + -3x^3, +3x^4$

$$\frac{-3x^2}{1+x}$$

d) $1 + 2x + x^2 + x^3 + x^4$

$$\frac{x^2 - x - 1}{x - 1}$$

→

e) $(1+2x)^7$

f) $\frac{-3}{1+x}$ g) $\frac{x}{2x+1}$ h) $\frac{1}{1-x^2}$

b) a) $\frac{1}{x-1}$ b) $\frac{2x}{(1-2x)}$ c) $\frac{(2x-1)}{(1-x)^2}$

d) $\frac{(e^x-1)}{x}$ e) $\frac{x^2}{(1-x)^3}$ f) $\frac{((x+1)^{10}-1)}{x}$

16) egg/plain max = 8 $x^2+x^3+\ldots+x^8$

salty bagel = x^2+x^3

$$f(x) = (x^2+x^3+\ldots+x^8)^2 \cdot (x^2+x^3)$$

$$x^4+2x^5+3x^6+4x^7+5x^8+6x^9+7x^{10}+6x^{11}+5x^{12}+\ldots+2x^{15}+x^{16}) \cdot x^2+x^3$$

$$x^2(x^4+2x^5+3x^6\ldots) + x^3(x^4+2x^5\ldots)$$

$x^{10}=7$ $x^9=6$

$7+6=\boxed{13}$

18) $f(x) = (x^1+x^2+\ldots+x^{100}) \cdot (x^1+x^2+\ldots+x^{10}) \cdot (x^1+x^2+\ldots+x^{10}$