

# Assignment 11

73

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

254

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

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

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

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

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

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

$$f(1) = 0$$

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

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

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

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

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

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

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

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

$$f(256) = 2f(128) + 3 = 2045$$

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

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

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

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

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

$$14) \begin{aligned} r(2^1) &= 2/2 = 1, 1 \\ r(2^2) &= 4/2 = 2/2 = 1, 2 \\ r(2^3) &= 8/2 = 4/2 = 2/2 = 1, 3 \end{aligned}$$

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

$$16) r_{2^k} = k$$

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

7.4

$$2) 1 + 4x + 16x^2 + 64x^3 + 256x^4$$

$$a=1 \quad r=4x$$

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

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

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

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

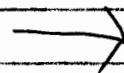
$$\frac{1}{1-3x}$$

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

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

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

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



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

$$f) \frac{-3}{1+x}$$

$$g) \frac{x}{2x+1}$$

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

$$b) a) \frac{1}{x-1}$$

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

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

$$d) \frac{(e^x - 1)}{x}$$

$$e) \frac{x^2}{(1-x)^3}$$

$$f) \frac{((x+1)^{10} - 1)}{x}$$

$$16) \text{ egg/plain max} = 8 \quad x^2 + x^3 + \dots + x^8$$

$$\text{salty bagel} = x^2 + x^3$$

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

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

$$\begin{array}{c} \uparrow \qquad \qquad \qquad \uparrow \\ x^2(x^4 + 2x^5 + 3x^6 \dots) + x^3(x^4 + 2x^5 \dots) \\ x^{10} = 7 \qquad x^9 = 6 \\ 7 + 6 = \boxed{13} \end{array}$$

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