

# 3.2 Discrete Math day 3 page 1

pg 146 Exercise #83-90 all

pg 147 Exercise #116-121 all, 129, 130

$$S_n = 2n - 1, n \geq 1$$

(83)  $s_1 = 1, s_2 = 3, s_3 = 5, s_4 = 7, s_5 = 9, s_6 = 11, s_7 = 13$

(84)  $s_1 = 1, s_3 = 5, s_5 = 9, s_7 = 13, s_9 = 17, s_{11} = 21, s_{13} = 25$

(85)  $n_k = 1, 3, 5, \dots$   $n_k = 2k - 1$

(86)  $s_{n_k} = s_{n_{k-1}} = 2(2k-1) - 1 = 4k - 2 - 1 = \boxed{4k - 3}$

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$$t_n = 2^n \quad n \geq 1$$

(87)  $t_1 = 2, t_2 = 4, t_3 = 8, t_4 = 16, t_5 = 32, t_6 = 64, t_7 = 128$

(88)  $t_1 = 2, t_2 = 4, t_4 = 16, t_7 = 256, t_{11} = 2048, t_{16} = 2^{16}, t_{22} = 2^{22}$

(89)  $\frac{k(k-1)+2}{2}$  obvious Right. ok - I looked at the answer Book

(90)  $t_{n_k} = t_{\frac{k(k+1)+2}{2}} = 2^{\frac{k(k+1)+2}{2}}$

Exercises pg 147 # 116 - 121 all, 129, 130

- 116 (a) baabcaaba (b) caabababab (c) baabbaab  
 (d) caabacaaba (e) 9 (f) 9  
 (g) 8 (h) 10 (i) baab  
 (j) caaba (k) baabcaabababab (l) caabacaabababab

(117)  $00, 01, 10, 11$

(119)  $000, 001, 010, 011, 100, 101, 110, 111$

(118)  $\lambda, 0, 1, 00, 01, 10, 11$

(120)  $\lambda, 0, 1, 00, 01, 10, 11, 000, 001, 010, 011, 100, 101, 110, 111$

(121)  $\lambda, a, b, c, ba, ab, bc, bab, abc, babc$

(129)  $f(a) = aab$

Suppose  $f(a) = f(b)$  then  $aab = bab$ , Thus  $a = b$   $\therefore f$  is one to one

Since  $|f(a)| \geq 2$  for all  $a \in X^*$ ,  $f(a) \neq \lambda$  (empty set)  
 for all  $a \in X^*$   $\therefore f$  is not onto.

(130)  $f(a) = aa$

Suppose  $f(a) = f(b)$ , then  $aa = bb$ , thus  $a = b$   $\therefore f$  is one-to-one

$|f(a)|$  is an even integer for all  $a \in X^*$ , therefore  $f(a) \neq aaa$   
 for all  $a \in X^*$   $\therefore f$  is not onto.