

Quiz 6 CprE 310

Jacob Boicken

1.)  $a_n = (a_{n-1})^2 - 1$

$$a_1 = 2^2 - 1 = 3$$

$$\boxed{a_3 = (8)^2 - 1 = 63}$$

$$a_0 = 2$$

$$a_2 = (3)^2 - 1 = 8$$

$$\boxed{a_4 = (63)^2 - 1 = 3968}$$

2.)  $a_1 = 2 \quad a_2 = 9 \quad a_n = 2a_{n-1} + 3a_{n-2} \quad n \geq 3$

$$a_n \leq 3^n$$

$$a_{n+1} = 2a_n + 3a_{n-1}$$

$$2a_n + 3a_{n-1} \leq 2 \cdot 3^n + 3 \cdot 3^{n-1} = 2 \cdot 3^n + 3^n = 3 \cdot 3^n \\ = 3^{n+1}$$

$$\text{So } a_{n+1} \leq 3^{n+1}$$

3.)  $P(4)$  is true (one 4 cent postage cost)

$P(7)$  is true (one 7 cent postage cost)

$$P(n) = 4(k_1) + 7(k_2) \quad k_1 \leq n/4 \quad k_2 \leq n/7$$

some # of 4¢  
some # of 7¢

$$P(n+1): \text{ case 1: } P(n+1) = P(n-4) + 4$$

$$\text{case 2: } P(n+1) = P(n-7) + 7$$

$P(18) \rightarrow 7, 7, 4$  + case  
 $P(19) \rightarrow 4, 4, 4, 7$  + case  
 $P(20) \rightarrow 4, 4, 4, 4, 4$  + case  
 $P(21) \rightarrow 7, 7, 7$  + case