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

Initial conditions

$a_0 = 1$

$a_1 = 2$

What are a_2 and a_3?

Is $\{a_n\}$ a solution of $a_n = 8a_{n-1} - 16a_{n-2}$ when

2. $a_n = 0$

3. $a_n = 2^n$

4. Find closed form solution for:

$a_n = a_{n-1}+4$

$a_0 = 2$

Population growing at 1.3% a year.

5. Recurrence for population after n years.

$P_n =$

6. Explicit formula

Initial conditions for 2009.

$P_0 = 6,800,000,000$

$P_1 = 1.013P_0$

7. Population in 20 years?

$a_n = 7a_{n-1} - 10a_{n-2}$ Initial conditions $a_0 = 2$, $a_1 = 1$

8. What is c_1, c_2?

9. Find the roots, r_1, r_2 $r^2 - c_1 r - c_2 = 0$

10. Solve $a_n = \alpha_1 r^n_1 + \alpha_2 r^n_2$ for α_1 and α_2

11. Solve α_1 and α_2

12. Solve $a_n = \alpha_1 r^n_1 + \alpha_2 r^n_2$ by substituting

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

$a_0 = 1$

$a_1 = 2$

What are a_2 and a_3?

$a_2 = a_{2-1} + 3a_{2-2} = a_1 + 3a_0 = 2 + 3(1) = 5$

$a_3 = a_{3-1} + 3a_{3-2} = a_2 + 3a_1 = 5 + 3(2) = 11$

Is $\{a_n\}$ a solution of $a_n = 8a_{n-1} - 16a_{n-2}$ when

2. $a_n = 0$

a_n	$= 8a_{n-1} - 16a_{n-2}$	
	$= 8(0) - 16(0)$	
	$= 0$	Yes

3. $a_n = 2^n$

a_n	$= 8a_{n-1} - 16a_{n-2}$	
	$= 8(2^{n-1}) - 16(2^{n-2})$	
	$= 2^3(2^{n-1}) - 2^4(2^{n-2})$	
	$= 2^{n+2} - 2^{n+2}$	
	$= 0$	No

4. Find closed form solution for:

$a_n = a_{n-1}+4$

$a_0 = 2$

a_n	$= a_{n-1} + 4$
	$= (a_{n-2} + 4) + 4$
	$= (a_{n-3} + 4) + 2*4$
	$= a_{n-3} + 3*4$
	$= a_0 + n*4$
	$= 2 + n*4$

Population growing at 1.3% a year.

5. Recurrence for population after n years.

a. $P_n = P_{n-1} + 0.013P_{n-1} = 1.013P_{n-1}$

6. Explicit formula

Initial conditions for 2009.

$P_0 = 6{,}800{,}000{,}000$

$P_1 = 1.013P_{1-1} = 1.013P_0$

$P_2 = 1.013P_1 = (1.013)(1.013)P_0 = 1.013^2P_0$

$P_3 = (1.013)P_2 = (1.013)\ 1.013^2P_0 = 1.013^3P_0$

:

$P_n = (1.013)P_{n-1} = (1.013)1.013^{n-1}P_0 = 1.013^nP_0$

7. Population in 20 years?

$P_{20} = 1.013^{20}\ 6{,}800{,}000{,}000$

$a_n = 7a_{n-1} - 10a_{n-2}$ Initial conditions $a_0 = 2$, $a_1 = 1$

8. What is c_1, c_2?

$c_1 = 7$, $c_2 = -10$

9. Find the roots, r_1, r_2 $r^2 - c_1 r - c_2 = 0$

$r^2 - 7r + 10 = 0$

$(r-5)(r-2)$

$r_1 = 5$, $r_2 = 2$

10. Solve $a_n = \alpha_1 r^n_1 + \alpha_2 r^n_2$ for α_1 and α_2

$a_0 = 2$

$= \alpha_1(5)^0 + \alpha_2 (2)^0$

$= \alpha_1 + \alpha_2$

$a_1 = 1$

$= \alpha_1(5)^1 + \alpha_2(2)^1$

$= 5\alpha_1 + 2\alpha_2$

11. Solve α_1 and α_2

$2\alpha_1 + 2\alpha_2 = 4$

$-(\underline{5\alpha_1 + 2\alpha_2 = 1})$

$-3\alpha_1 = 3$

$\alpha_1 = -1$

$\alpha_1 + \alpha_2 = 2$

$-1 + \alpha_2 = 2$

$\alpha_2 = 3$

12. Solve $a_n = \alpha_1 r^n_1 + \alpha_2 r^n_2$ by substituting

$a_n = \alpha_1 r^n_1 + \alpha_2 r^n_2$

$= (-1)(5)^n + (3)(2)^n$