

MAT 116 In-class Problems (#8)

July 22, 2010 and July 26, 2010

Problem 1. Find the number h_n of bags of (n pieces of) fruit that can be made out of apples, bananas, oranges, and pears, where, in each bag, the number of apples is even, the number of bananas is a multiple of 5, the number of oranges is at most 4, and the number of pears is 0 or 1.

Answer: $h_n = n + 1$

Problem 2. Solve the recurrence relation $h_n = (n + 2)h_{n-1}$ with initial value $h_0 = 2$.

Answer: $h_n = (n + 2)!$

Problem 3. Solve the recurrence relation $h_n = 5h_{n-1} - 6h_{n-2}$ with initial values $h_0 = 1$ and $h_1 = -2$.

Answer: $h_n = 5 \cdot 2^n - 4 \cdot 3^n$

Problem 4. Solve the recurrence relation $h_n - 6h_{n-1} + 11h_{n-2} - 6h_{n-3} = 0$ with initial values $h_0 = 4$, $h_1 = 7$, and $h_2 = 25$.

Answer: $h_n = 7 - 9 \cdot 2^n + 6 \cdot 3^n$

Problem 5. Solve the recurrence relation $h_n = 4h_{n-1} - 4h_{n-2}$ with initial values $h_0 = 1$ and $h_1 = 8$.

Answer: $h_n = 2^n + 3n \cdot 2^n$

Problem 6. Solve the recurrence relation $h_n - 5h_{n-1} + 8h_{n-2} - 4h_{n-3} = 0$ with initial values $h_0 = 2$, $h_1 = 3$, and $h_2 = 7$.

Answer: $h_n = 3 - 2^n + n2^n$