

**Math 2300 – Spring 2016**  
**Homework 21**

Solve the following recurrence relations:

For 1-3 use the theorem on the handout, for 4 and 5 use generating functions.

1.  $a_k = 4a_{k-1} - 9$ ,  $k \geq 1$ ,  $a_0 = 1$

2.  $a_k = 4a_{k-1} - 4a_{k-2} + k$ ,  $k \geq 2$ ,  $a_0 = 5$ ,  $a_1 = 9$

3.  $a_k = 2a_{k-1} + 3a_{k-2} + 5^k$ ,  $k \geq 2$ ,  $a_0 = -2$ ,  $a_1 = 1$

4.  $a_k = 2a_{k-1}$ ,  $k \geq 1$ ,  $a_0 = 1$

5.  $a_k = 2a_{k-1} + 1$ ,  $k \geq 1$ ,  $a_0 = 1$