

Math 2300, Spring 2017 – Discrete Structures  
Sample Problems  
Material Covered Since Quiz 2

For 1-3 use the theorem on the handout.

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. Let  $A = \{1,2,3\}$  and  $B = \{x,y\}$ .

a. List the elements of  $A \times B$ .

b. List the elements of the power set of  $A$ :  $\mathcal{P}(A)$ .

5. Let  $A$ ,  $B$ , and  $C$  be sets. Prove that  $(A \times B) \cup (A \times C) \subseteq A \times (B \cup C)$ .

6. Let  $A$ ,  $B$ , and  $C$  be sets. Use set identities to prove that  $(A - B) - C = A - (B \cup C)$ .

7. Assume that all sets are subsets of a universal set  $U$  and prove that for all sets  $A$  and  $B$ , if  $A \subseteq B$ , then  $A \cap B^c = \emptyset$ .