

**CS 341 Automata Theory**  
**Discussion Session Worksheet 3**  
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1. Let  $A = \{a^M b^N : M = 0, N = 0\}$ ,  $B = \{c^M d^N : M = 0, N = 0\}$ .  $AB = ?$ 
  - a.  $\{\}$
  - b.  $a^M b^N c^M d^N$
  - c.  $a^* b^* c^* d^*$
  - d.  $a^M c^M b^N d^N$
  - e. none of a – d
  
2. If A is regular and B is regular, is  $A \cup B$  regular?
  - a. Yes
  - b. No
  - c. Not enough information
  
3. If A is regular, C is regular and  $A \cup B = C$ , is B regular?
  - a. Yes
  - b. No
  - c. Not enough information
  
4. Is  $\{a^N b^N : N = 0\}$  regular?
  - a. Yes
  - b. No
  - c. Not enough information
  
5. Is  $\{a^M b^N : M = 0, N = 0\}$  regular?
  - a. Yes
  - b. No
  - c. Not enough information
  
6. Let  $L = \{a^M b^N : M = 2N, M = 0, N = 0\}$ . Is L regular?
  - a. Yes
  - b. No
  - c. Not enough information
  
7. Let  $L = \{a^M b^N : M + N \text{ is a multiple of } 3, M = 0, N = 0\}$ . Is L regular?
  - a. Yes
  - b. No
  - c. Not enough information

8. Let  $L = \{a^M b^N : M \leq N, M \geq 0, N \geq 0\}$ . Is  $L$  regular?
- Yes
  - No
  - Not enough information

Answers: 1 c, 2 a, 3 c, 4 b, 5 a, 6 b, 7 a, 8 b