

Exercise 1.6.2

Introduction to Discrete Mathematics MATH 2001

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ABSTRACT. This is Exercise 1.6.2 from Hammack [Ham13, §1.6]:

Exercise 1.6.2. Let $A = \{0, 2, 4, 6, 8\}$ and $B = \{1, 3, 5, 7\}$ have universal set $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$.

Find:

- (a) A^C
- (b) B^C
- (c) $A \cap A^C$
- (d) $A \cup A^C$
- (e) $A - A^C$
- (f) $(A \cup B)^C$
- (g) $A^C \cap B^C$
- (h) $(A \cap B)^C$
- (i) $A^C \times B$

Recall that I am using the notation $A^C = U - A$ for the complement (while the book uses the notation $\bar{A} = U - A$ for the complement).

Solution. We have:

- (a) $A^C = B = \{1, 3, 5, 7\}$
- (b) $B^C = A = \{0, 2, 4, 6, 8\}$
- (c) $A \cap A^C = \emptyset$
- (d) $A \cup A^C = U = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$
- (e) $A - A^C = A = \{0, 2, 4, 6, 8\}$
- (f) $(A \cup B)^C = \emptyset$
- (g) $A^C \cap B^C = \emptyset$

Date: January 30, 2022.

(h) $(A \cap B)^C = U = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$

(i) $A^C \times B = B \times B = \{(1, 1), (1, 3), (1, 5), (1, 7), (3, 1), (3, 3), (3, 5), (3, 7), (5, 1), (5, 3), (5, 5), (5, 7), (7, 1), (7, 3), (7, 5), (7, 7)\}$

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REFERENCES

[Ham13] Richard Hammack, *Book of proof*, Creative Commons, 2013.

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