

Homework #1Due ~~Friday, September 5~~ **Monday, September 8** in Gradescope by **11:59 pm ET**

- **READ** Section 1.1 in Richmond&Richmond
 - **WATCH** Video 1: Combining More Than Two Sets (11:23) [Found on moodle site]
 - **WRITE AND SUBMIT** solutions to the following problems.
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Problem 1. (4 points) Section 1.1, #1(a,b):

- (a) True or False (and briefly explain why): $\{\text{Red, White, Blue}\} = \{\text{White, Blue, Red}\}$
- (b) Briefly explain what is wrong with this statement:
Red is the first element of the set $\{\text{Red, White, Blue}\}$

Problem 2. (4 points) Section 1.1, #3(b-e):In each part, fill in the blank with the appropriate symbol, \in or \subseteq . (No explanations required.)

- (b) 3 $\underline{\hspace{1cm}}$ $\{1, 2, 3, 4\}$ (c) $\{3\}$ $\underline{\hspace{1cm}}$ $\{1, 2, 3, 4\}$
- (d) $\{a\}$ $\underline{\hspace{1cm}}$ $\{\{a\}, \{b\}, \{a, b\}\}$ (e) \emptyset $\underline{\hspace{1cm}}$ $\{\{a\}, \{b\}, \{a, b\}\}$

Problem 3. (10 points) Section 1.1, #6(a,b,d):

Include brief justifications as you answer the following:

- (a) (2 points): How many subsets does the empty set have?
- (b) (3 points): How many subsets does the set $\{1\}$ have?
- (d) (5 points): List all the subsets of the four-element set $\{1, 2, 3, 4\}$.

Problem 4. (9 points) Section 1.1, #10(a):For each $k \in \{1, 2, \dots, 20\}$, let $D_k = \{x \mid x \text{ is a prime number that divides } k\}$.Find the sets D_1 , D_2 , D_{10} , and D_{20} . (And give brief justifications.)

[Recall/FYI: a prime number is an integer $p \geq 2$ divisible only by itself and 1. (Note that 1 is not prime, because of the $p \geq 2$ condition.) Also recall that we say m divides n if there is an integer i such that $n = m \cdot i$.]

Problem 5. (8 points) Section 1.1, #10(b(i-iii)):

With notation as in the previous problem: True or false (and briefly justify):

- (i) $D_2 \subsetneq D_{10}$ (ii) $D_7 \subseteq D_{10}$ (iii) $D_{10} \subsetneq D_{20}$

[Note: The textbook uses the symbol \subset to mean “proper subset” but I personally use \subsetneq , so I have made that symbol change in writing parts b(i) and b(iii) above.]

Questions? You can ask in class or in:**My office hours** (SMUD 406):

Mon, 2:00–3:30pm; Tue, 1:45–3:15pm; Fri, 1:00–2:00pm; or by appointment.

Also, you may email me any time at rlbenedetto@amherst.edu