CS2022/MA2201
HW#3

DUE: Monday, September 15

1. (6 points) What can we say about the sets *A* and *B* in each of the following cases?
(a) $A \cap B = B$
(b) $A \cup B = B$
(c) $A - B = B - A$

2. (1 point) What is the power set of $\{\{a\},\varnothing\}$?

3. (3 points) Neil is worried vabout the low grades in his class, so he'll apply the transform $f_{Neil}(x) = \lceil \sqrt{x} \rceil * 10$. Is f_{Neil} a function from $\mathbb{N} = \{0,1,2,...\}$ to $\mathbb{Z} = \{...,-2,-1,0,1,2,...\}$?

4. (10 points) Do **Exercise 1.8.6** from the text. In part **c)**, take the absolute value of the difference. In all five parts, take the smallest domain and range possible to satisfy the problem.

5. (8 points) Do **Exercise 1.8.16** from the text.

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HW#3 SOLUTIONS

1. (a) $B \subseteq A$ (b) $A \subseteq B$ (c) $A = B$

2. $\{\varnothing, \{\{a\}\}, \{\varnothing\}, \{\{a\}, \varnothing\}\}$

3. No. $f(49)$ is -70 and 70.

4.

	Domain	Range
(a)	$\mathbb{Z}^+ \times \mathbb{Z}^+$	$\mathbb{Z}^+$
(b)	$\mathbb{Z}^+$	{1,2,3,4,5,6,7,8,9}
(c)	{bit strings}	$\mathbb{N}$
(d)	$\mathbb{Z}^+$	$\mathbb{Z}^+$
(e)	{bit strings}	{strings of 1's}

5. (a) $f(n) = n+1$

(b) $f(n) = \lfloor n/2 \rfloor$

(c) $f(n) = \begin{cases} n+1, \text{if } n \text{ is even} \\ n-1, \text{if } n \text{ is odd} \end{cases}$

(d) $f(n) = 42$