

Four of these problems will be graded (our choice, not yours!), with each problem worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor.

1. For sets  $A, B, C$ , and  $D$ ,  $A \subseteq B \wedge C \subseteq D \Rightarrow A \times C \subseteq B \times D$ .
2. For sets  $A, B, C$ , and  $D$ ,  $(A \cap B) \times (C \cap D) = (A \times C) \cap (B \times D)$ .
3. For sets  $A, B, C$ , and  $D$ ,  $(A \cup B) \times (C \cup D) = (A \times C) \cup (B \times D)$ .
4. Let  $f$  and  $g$  be bounded functions, both with domain  $D$ . Then  $f - g$  is a bounded function.
5. Let  $f$  and  $g$  be bounded functions, both with domain  $D$ . Then  $f/g$  is a bounded function.
6. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  and  $g : \mathbb{R} \rightarrow \mathbb{R}$  be functions, and suppose  $f$  is bounded. Then  $f \circ g$  is bounded.
7. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  and  $g : \mathbb{R} \rightarrow \mathbb{R}$  be functions, and suppose  $g$  is bounded. Then  $f \circ g$  is bounded.
8. The composition of two decreasing functions is \_\_\_\_\_.