Basic Information

This assignment is due in Gradescope by 10 PM on the dates below.

Make sure you understand MHC honor code and have carefully read and understood the additional information on the class syllabus and the grading rubric. I am happy to discuss any questions or concerns you have!

You are always welcome to ask me for small hints or suggestions on problems.

Problems

Monday Reading Problem 1M (Due: September 7)

You'll learn in the reading for Monday that $\mathcal{P}(A)$ is the notation for the *power set* of a set A. What is $\mathcal{P}(\{1,2\} \times \{3\})$? Briefly explain the process you used to get your answer.

List 6 elements in the set $\mathcal{P}(\mathcal{P}(\{1,2\}))$. How many total elements are in this set? (Hint: the reading for Monday's class probably helps with this question!)

Wednesday Problems HW1 (Due: September 10)

1. How would you write the set of rational numbers between $-\frac{1}{2}$ and $\frac{3}{4}$ in set builder notation? How about the odd integer multiples of 5 in set builder notation?

2. Describe all the elements in the following sets A. Briefly explain how you got your answer.
   a. $A = \{x \in \mathbb{R} : x^2 + 5x = -6\}$
   b. $A = \{x \in \mathbb{R} : x^2 = -1\}$
   c. $A = \left\{ x \in \mathbb{Z} : x^2 - \frac{1}{2}x = \frac{1}{2} \right\}$

3. Are the following sets B infinite or finite? Why or why not?
   a. $B = \{x \in \mathbb{Z} : |x| < 10\}$
   b. $B = \{x \in \mathbb{R} : |x| < 10\}$

4. Suppose $A = \{b, c, d\}$ and $B = \{a, b\}$. Find each of the following: (This is exercise 2.5 #4 (a) to (e) in DME.) Briefly explain your answers.

   a. $(A \times B) \cap (B \times B)$
   b. $(A \times B) \cup (B \times B)$
   c. $(A \times B) - (B \times B)$
   d. $(A \cap B) \times A$
   e. $(A \times B) \cap B$

5. Let $U = \mathbb{Z}$ and $A = \{3x + 2 : x \in \mathbb{Z}\}$.

   a. Is $17 \in \bar{A}$? Why or why not?
   b. Is $15 \in \bar{A}$? Why or why not?

Friday Reading Problem 1F (Due: September 11)

Are the following statements true or false? Briefly explain why you gave the answer you did.

   a. There is an $x \in \mathbb{R}$ so that $x \notin \mathbb{Q}$.
   b. For every $x \in \mathbb{R}$, $x > 5$.
   c. There is an $x \in \mathbb{R}$ so that for all $y \in \mathbb{Q}$, $x > y$.
   d. For every $x \in \mathbb{R}$ there is a $y \in \mathbb{Q}$ so that $x > y$.