HOMEWORK 3 **DUE: Fri., Apr. 11** **NAME:**

DIRECTIONS:

- Turn in your homework as **SINGLE-SIDED** typed or handwritten pages.
- **STAPLE** your homework together. Do not use paper clips, folds, etc.
- **STAPLE** this page to the front of your homework.
- Be sure to write your name on your homework.
- Show all work, **clearly and in order**.

You will lose point 0.5 points for each instruction not followed.

Questions	Points	Score
1	1	
2	1	
3	1	
4	1	
5	1	
Total	5	

Problem 1: (1 point)

(a) (0.5 point) Show that $\{(-a, b)\}$ is an additive inverse for $\{(a, b)\}$.

(b) (0.5 point) Prove the distributive law for $\mathbb{Q}$.

Problem 2: (1 points) Let R be a ring and R_0 a nonempty subset of R. Show that R_0 is a subring iff, for any a, $b \in R_0$, we have $a - b$, $ab \in R_0$.

Problem 3: (1 points) Let X be a non-empty set and R be the power set of X. Prove that R with symmetric difference as addition and intersection as multiplication is a commutative ring with identity.

Problem 4: (1 point) Let $A = \{p, q, r\}$ and $B = \{\pi, e\}$. Determine all possible functions from A to B.

Problem 5: (1 points) Given $f : A \to B$, suppose there exist g, $h : B \to A$ so that $f \circ g = I_B$ and $h \circ f = I_A$. Show that f is a bijection and that $g = h = f^{-1}$.