OLGA RADKO MATH CIRCLE: ADVANCED 3

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Fall Final Exam I

Name: ____

Problem 1	/10
Problem 2	/10
Problem 3	/10
Problem 4	/10
Problem 5	/10
Total	/50

Say if the following statements are True or False. Prove the True ones and give a counterexample for the False ones

Problem 1:

___ The intersection of two ideals is an ideal.

___ The intersection of two subrings of a ring R is a subring of R.

Solution 1:

Problem 2:

___ The set of all non-invertible elements in a field forms an ideal

___ The set of all non-invertible elements in a ring forms an ideal.

Solution 2:

Problem 3:

___ A ring R is a field if and only if its only ideals are $\{0\}$ and R.

___ A ring R is a field if and only if it contains no subring other than itself.

Solution 3:

Problem 4:

___ If F is a field and R is a subring of F, then R is a field.

___ If R is a ring that is not a field, and S is a subring of R. Then S is not a field.

Solution 4:

Problem 5:

___ If R and S are rings containing no zero-divisors, then $R \times S$ contains no zero-divisor.

___ If R is a finite ring containing no zero divisors, then R is a field.

Solution 5:

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