

Name:

Problem 1 (5 points). Circle all the true statements. No justification required.

- a) \mathbb{Z}_7 is a field.
- b) \mathbb{Z}_9 is a domain.
- c) Every domain is a field.
- d) In a field, $ab = 0$ implies $a = 0$ or $b = 0$.
- e) Every subring of a field is a field.
- f) Every subring of a domain is a domain.

Problem 2 (5 points). Let R and S be rings, and $\varphi : R \rightarrow S$ be a ring homomorphism. Prove that the image of φ is a subring of S .

Problem 3 (Bonus). Prove that for any ring R , the set of ring homomorphisms $R \rightarrow R$ is a ring with the usual addition of maps and with multiplication given by composition.