

Name:

ID:

Week of Oct. 2

Version 1

Math 120B - Quiz #1

In this quiz you may use both sides of this sheet for your work if you need to. Please clearly separate the work from different problems by drawing lines between them, and please write complete proofs where required. (If you are not sure what you can assume for a proof, **ask the instructor or prove your assumption**)

1. (5 pts.) Prove the set with the binary operations specified is a ring or show why it is not. The set is $\mathbb{R} \times \mathbb{Z}$ with the usual addition and a different multiplication given by:

$$(x_1, n_1) \cdot (x_2, n_2) = (0, 0)$$

$$\forall x_1, x_2 \in \mathbb{R} \text{ and } \forall n_1, n_2 \in \mathbb{Z}.$$

2. (4 pts.) Show why the following group homomorphism is **not** a ring homomorphism:

$$\varphi : \mathbb{Z} \rightarrow 4\mathbb{Z}$$

$$n \rightarrow 4n$$

- (1 pt) Ask one question related to Ring Theory or suggest a way to improve discussion:
