

# Math 531 Homework 11

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## 1 Section 5.2

- Problem 1: Let  $R$  be a commutative ring, and let  $D$  be an integral domain. Let  $\phi : R \rightarrow D$  be a nonzero function such that  $\phi(a + b) = \phi(a) + \phi(b)$  and  $\phi(ab) = \phi(a)\phi(b)$ , for all  $a, b \in \mathbb{R}$ . Show that  $\phi$  is a ring homomorphism.

*Proof.* N2S:

1.  $\phi(a + b) = \phi(a) + \phi(b)$ . Given.
2.  $\phi(ab) = \phi(a)\phi(b)$ . Given.
3.  $\phi(1) = 1$ .

QED

- Problem 2:

## 2 Section 5.3

- Problem 8: