

2. MATH 30A, FALL 2009  
HOMEWORK 2

Due: Thursday, Sept 10, at noon (in class).

Homework counts 50% of your grade. Late homework will incur a penalty.

When the problem is computational, show the steps you used to get your answer. Write answers in complete sentences.

2.1. **Problems from section 1.** Page 19, numbers 9, 18, 19, 26, 27, 31, 32, 36.

2.2. **Additional problems.** An *isomorphism*  $\phi : \mathbb{Z}_n \rightarrow \mathbb{Z}_n$  is a bijection with the property that

$$\phi(x +_n y) = \phi(x) +_n \phi(y)$$

- (1) Show that if  $n$  is odd then  $\phi(x) = x +_n x$  is an isomorphism. Illustrate this using  $n = 5$ .
- (2) Show that  $\phi(0) = 0$  for any isomorphism.

Key words/concepts: Modular addition, isomorphism.