Math 270 - Basic Discrete Mathematics
Practice Quiz on Section 4.5
Solutions

Directions: Answer the problems given below.

1. Evaluate each of the following:

a. 28 div 5 = 5 ; $28 = 5 \cdot 5 + 3$

quotient quotient remainder

b. 28 mod 5 = 3

remainder

c. 13 div 25 = 0

$13 = 25 \cdot 0 + 13$

quotient remainder

d. 13 mod 25 = 13

2. Prove that for every integer n, if n mod 6 = 4, then n^2 mod 6 = 4.

<u>Proof:</u> Let n be an arbitrary integer, and suppose $n \bmod 6 = 4$. Then $\exists q \in \mathbb{Z}$ such that $n = 6q + 4$.

Then

$$n^2 = (6q+4)^2 = 36q^2 + 48q + 16$$
$$= 36q^2 + 48q + 12 + 4$$
$$= 6(6q^2 + 8q + 2) + 4.$$

Then $6q^2 + 8q + 2 \in \mathbb{Z}$ by closure, and since $0 \le 4 < 6$, it follows from the uniqueness of the Quotient-Remainder Theorem that $n^2 \bmod 6 = 4$. Since n was arbitrary, the proof is complete. ∎