

Homework 6 — The division algorithm.

1. a.  $44/8 \Rightarrow \text{Quotient} = 4 \text{ Remainder} = 2$   
b.  $-1/23 \Rightarrow -1 = 23q + r \Rightarrow \text{Quotient} = -1 \text{ Remainder} = 22$   
c.  $-2002/87 \Rightarrow -2002 = 87q + r \Rightarrow \text{Quotient} = -24 \text{ Remainder} = 86$   
d.  $0/17 \Rightarrow \text{Quotient} = 0 \text{ Remainder} = 0$
2. a. 100 hrs after 2:00  $\Rightarrow 100/24 \Rightarrow Q = 4 \text{ R} = 4 \Rightarrow 2 + 4 = 6$  Answer: 6:00  
b. 168 hrs after 19:00  $\Rightarrow (168 + 19)/24 \Rightarrow Q = 7 \text{ R} = 19 \Rightarrow$  Answer: 19:00
3. a.  $37/7 \Rightarrow Q=5 \text{ R}=2$ . Answer: not congruent  
(Since remainder does not equal 3)  
b.  $-17/7 \Rightarrow -17 = 7Q + R \text{ } Q=-3 \text{ R}=4$ . Answer: not congruent  
(Since remainder does not equal 3)

## Modular Arithmetic

1. a.  $4 +_m 11 \Rightarrow 4 + 11 = 15 \Rightarrow 15/13 \text{ } Q=1 \text{ R}=2$ .

So,  $4 +_m 11 = 2$  when  $m=13$ .

b.  $4 *_m 11 \Rightarrow 4 * 11 = 44 \Rightarrow 44/13 \text{ } Q=3 \text{ R}=5$ .

So,  $4 *_m 11 = 5$  when  $m=13$ .