CECS 229: HW 2 (Division Algorithm, Congruence)

Spring 2021

Remember, we will not be collecting or grading homework. The homework is optional but highly recommended. Quiz questions will be similar to the homework questions but not identical. Solutions to these problems are posted on BeachBoard.

1. Using division algorithm, find the following values:

   a. 902 div 35 $= 25$

   b. 902 mod 35 $= 27$

   $902 = 35(25) + 27$

   c. -356 div 54 $= -7$

   d. -356 mod 54 $= 22$

   $-356 = 54(-7) + 22$

2. If you are using a standard military clock (0:00-23:59)...

   a. What time would it be 300 hours after 1:35?

   300 mod 24 = 12 12 hr after 1:35 = 13:35

   b. What time would it be 150,000 minutes after 23:30?

   60 min in 1 hr
   24 hr in 1 clock cycle
   60 x 24 = 1440

   150000 mod 1440 = 240 mins after 23:30

   240 div 60 = 4 hrs passed 240 mod 60 = 0 mins passed

   3:30

3. Find at least three values of x (where $x \neq a$) that would make each congruence statement true. Make sure that you have...
   - At least one negative x
   - At least one x where $0 \leq x < m$ in $x \equiv a(mod\ m)$
   - At least one positive x that is not the same as the other 2 values

   a. $x \equiv 21(mod\ 5)$
   Sample solns: $x = \cdots -4, 1, 6 \cdots$ $x = 21 + 5k,\ k \in \mathbb{Z}$

   b. $x \equiv -67(mod\ 19)$
   Sample solns: $x = \cdots -10, 9, 28 \cdots$ $x = -67 + 19k,\ k \in \mathbb{Z}$

   c. $x \equiv 123(mod\ 52)$
   Sample solns: $x = \cdots -33, 19, 71 \cdots$ $x = 123 + 52k,\ k \in \mathbb{Z}$

   d. $x \equiv -932(mod\ 35)$
   Sample solns: $x = \cdots -22, 13, 48 \cdots$ $x = -932 + 35k,\ k \in \mathbb{Z}$

   e. $x \equiv -542(mod\ 967)$
   Sample solns: $x = \cdots -1507, -542, 425, 1392 \cdots$ $x = -542 + 967k,\ k \in \mathbb{Z}$

   f. $x \equiv 3974(mod\ 431)$
   Sample solns: $x = \cdots -336, 95, 526 \cdots$ $x = 3974 + 431k,\ k \in \mathbb{Z}$