# Homework 4
# Questions and Solutions

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https://t.me/GATECSE_Goclasses

If you are an Enrolled Student, Please drop us a message or mail to join Private Telegram groups.

# Q1 True/False ?

1. $23 \equiv 3 \pmod{10}$
2. $23 \equiv 7 \pmod{8}$
3. $10000 \equiv 4 \pmod{7}$

# Solution

1. True $23 \equiv 3 \pmod{10}$ since $10 \mid (23 - 3)$.
2. True $23 \equiv 7 \pmod{8}$ since $8 \mid (23 - 7)$.
3. True $10000 \equiv 4 \pmod{7}$ since $(10000 - 4) = 9996 = 1428 \cdot 7$.

# Q2 True/False ?

1. If $a \equiv b \ (mod\ n)$ then $a + n \equiv b \ (mod\ n)$
2. If $a \equiv b \ (mod\ n)$ then $a + k \equiv b \ (mod\ n)$ for any $k$
3. If $a \equiv b \ (mod\ n)$ then $a + k \equiv b + k \ (mod\ n)$ for any $k$

# Solution

1. True
2. False
3. True


If you can not arrive with the solution currently
Then don’t worry we will cover one property in next class then this question will be very easy for you

# Q3. True/False ?

$-7 \equiv -57 \pmod{10}$

# Solution

$-7 \equiv -57 \pmod{10}$ True

Add 10 to -7 to check remainder. Remainder is 3

Add 60 to -57 to check remainder. Remainder is 3

# Bonus Question

Prove that if $a \mid b$ and $a \mid c$ then $a^2 \mid 7bc$.

▶ **Solution.** If $a \mid b$ then $b = ak$ for some integer $k$. If $a \mid c$, then $c = am$ for some integer $m$. Then

$$7bc = 7(ak)(am) = a^2(7km),$$

and thus $a^2 \mid 7bc$. ◀