# Discrete Mathematics (SC612)
# Tutorial 6
# $26^{th}$ November, 2021

1. Evaluate:
   (a) $5^{984861} \pmod{17}$
   (b) $7^{231987} \pmod{12}$
2. Solve the system of simultaneous congruences given below, for $x$.

$$x \cong 4 \pmod{7}$$
$$x \cong 2 \pmod{3}$$
$$x \cong 3 \pmod{4}$$
$$x \cong 4 \pmod{5}$$
$$x \cong 9 \pmod{11}$$

3. Is it possible to have a simple undirected graph $G$ on $n$ vertices, such that the degree sequence of $G$ is the same as the degree sequence of $\overline{G}$ for:
   (a) $n = 4$
   (b) $n = 5$
   (c) $n = 6$
   (d) $n = 7$
4. (a) Is a dominating set of a graph always a vertex cover?

(b) Is a vertex cover of a graph always a dominating set?

(c) What is the condition such that if $D$ is a dominating set, then $V \setminus D$ is also a dominating set?

5. Construct two $2 \times 2$ matrices $A$ and $B$ such that $A \neq B$, but $AC = BC$ where $C \neq 0$, the all 0's matrix.

6. Construct a $2 \times 2$ matrix $M$ such that its multiplication with the $2 \times 1$ vector with entries 1,4 results in the vector 1,4 itself.