

## SEF015: Discrete Mathematics (2022-23)

### ***Material for the Q&A session or...Tutorial 4 (Week 5)***

This material is for your tutorial in Week 5 and is designed to help your understanding. Please try to answer all the questions before you join your tutorial group.

Number of pages: 2

Question 1. For the sets A, B, C, D,

$$\begin{aligned} A &= \{1, 2, 3, \dots, 20\}, \\ B &= \{2, 4, 6, \dots, 20\}, \\ C &= \{x: x \text{ is a prime number between 4 and 20}\}, \\ D &= \text{The set of first five positive odd numbers.} \end{aligned}$$

which of the following is true and which is false?

- a.  $A \subseteq B$
- b.  $B \subseteq C$
- c.  $C \subseteq A$
- d.  $A \subseteq D$
- e.  $D \subseteq A$
- f.  $D \subseteq B$
- g.  $1 \in A$
- h.  $\{1\} \in A$
- i.  $\{1, 2, 3, \dots, 20\} \in A$
- j.  $\{1, 2, 3, \dots, 20\} \subseteq A$
- k.  $19 \notin C$
- l.  $\{9\} \notin D$
- m.  $A \cap B = B = B \cap A$
- n.  $A \cup B = A = B \cup A$
- o.  $C \cup D = \varnothing$
- p.  $B \cap D = \varnothing$

Question 2. Let  $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ . Write down the following sets explicitly:

- a)  $\{x \in U \mid x > 9\}$ ;
- b)  $\{x \in U \mid x > 2\}$ ;
- c)  $\{x \in U \mid x = 3k \text{ for some } k \in \mathbb{Z}\}$ ;
- d)  $\{x \in U \mid x = 11k \text{ for some } k \in \mathbb{Z}\}$ ;
- e)  $\{x \in U \mid (2 < x < 6) \vee (x = 6k \text{ for some } k \in \mathbb{Z})\}$

Question 3. Let  $A = \{a, b, c, d, e\}$ ,  $B = \{a, c, e, g\}$ ,  $C = \{b, e, f, g\}$ .

Verify the following:

- a)  $A \cup B = B \cup A$
- b)  $A \cap B = B \cap A$
- c)  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Question 4. Let  $\xi = \{0, 1, 2, 3, \dots, 100\}$ , here  $\xi$  is the universal set and with the following sets

$$A = \{1, 2, 3, \dots, 50\},$$

$$B = \{0, 2, 4, 6, \dots, 100\},$$

$$C = \{x: x \text{ is a prime number between 1 and 20}\},$$

$$D = \text{The set of first 10 positive multiples of 10.}$$

Investigate:

a)  $A - B, B - A$

b)  $A^c, B^c, D^c$