

MS115 Mathematics for Enterprise Computing
Tutorial Sheet 3

1. List the elements of the following sets:

(i) $\{n \in \mathbb{N} \mid n > 3 \text{ and } n^2 < 100\}$

(ii) $\{x \in \mathbb{Z} \mid x^2 = 4 \text{ or } 0 < x < 4\}$

(iii) $\{(n - 1)^2 + 2 \mid n \in \{2, 3, 4\}\}$

2. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ be the universal set and consider the following subsets of U :

$$A = \{1, 3, 5\}, \quad B = \{1, 3, 5, 7, 9\}, \quad C = \{2, 3, 5, 7\}, \quad D = \emptyset$$

Determine the following sets:

(i) $A \cup B$, (ii) $C \cup D$, (iii) $C \cap D$, (iv) $B - A$, (v) $A - B$,
(vi) $(A \cup C) - B$ (vii) \overline{A} (viii) $B - (\overline{A \cap C})$.

3. Determine whether the sets A , B and C are pairwise disjoint in each of the following cases:

(i) $A = \{3, 5\}$, $B = \{1, 4, 6\}$, $C = \{2\}$.

(ii) $A = \{2, 4, 6\}$, $B = \{3, 7\}$, $C = \{4, 5\}$.

Recall: A family of sets is pairwise disjoint if every pair of different sets in the family is disjoint.

4. Let $A = \{T, F\}$ and consider the set $A^3 = A \times A \times A$.

(i) Determine the cardinality of A^3 .

(ii) List the elements of A^3 .

5. Students at ABC university can study accounting, business or computing. It is possible to study one or two of these subjects, but not all three. This year, 16 students are studying accounting, 23 are studying business and 30 are studying computing. There are 5 students studying accounting and business, 2 students studying accounting and computing and 15 students studying business and computing.

(i) How many students are studying at least one of accounting, business and computing?

(ii) How many students are studying computing only?