Mathematics for Computing
Set Theory

1 Section 2 Set Theory

- A Set is a collection of distinct and defined elements.
- Sets are represented by using French braces {} with commas to separate the elements in a Set.

(a)

(b)

(c)

1.1 Important Operations in Set Theory

- Union ($\cup$) - also known as the OR operator. A union signifies a bringing together. The union of the sets A and B consists of the elements that are in either A or B.
- Intersection ($\cap$) - also known as the AND operator. An intersection is where two things meet. The intersection of the sets A and B consists of the elements that in both A and B.
- Complement (^{c}) - The complement of the set A consists of all of the elements in the universal set that are not elements of A.

2.a Describe the following set by the listing method

$$\{2r + 1 : r \in Z^{+} and r \leq 5\}$$

2.b Let A,B be subsets of the universal set U.

3.a Let n be an element of the set $\{10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$, and p and q be the propositions: p : n is even, $q : n > 15$. Draw up truth tables for the following statements and find the values of n for which they are true: (i) $p \vee \neg q$ (ii) $\neg p \wedge q$

1.2 Universal Set and the Empty Set

The first is the ***universal set***, typically denoted U. This set is all of the elements that we may choose from. This set may be different from one setting to the next.

For example one universal set may be the set of real numbers whereas for another problem the universal set may be the whole numbers $\{0, 1, 2, \ldots\}$.

The other set that requires consideration is called the ***empty set***. The empty set is the unique set is the set with no elements. We write this as {} and denote this set by $\emptyset$.

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\section{Number Sets}
 The font that the symbols are written in (i.e. $\mathbb{N}$, $\mathbb{R}$) is kn
\begin{itemize}
 \item $\mathbb{N}$ Natural Numbers ($0,1,2,3$)
(Not used in the CIS102 Syllabus)
\item $\mathbb{Z}$ Integers ($-3,-2,-1,0,1,2,3, \ldots$)
\begin{itemize}
\item[$\ast$] $\mathbb{Z}^{+}$ Positive Integers
\item[$\ast$] $\mathbb{Z}^{-}$ Negative Integers
\end{itemize}
\item $\mathbb{Q}$ Rational Numbers
\item $\mathbb{R}$ Real Numbers
\end{itemize}
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(a)

(b)

(c)