

Problem 2

When working with real numbers, our universal set is \mathbb{R} . Find each of the following sets.

(a) $[6, 8] \cup [2, 7)$

(b) $[6, 8] \cap [2, 7)$

(c) $[0, 1]^c$

(d) $[6, 8] - (2, 7)$

Solution

$[6, 8] \cup [2, 7)$ is the union of elements in the sets $[6, 8] = 6 \leq x \leq 8$ and $[2, 7) = 2 \leq x < 7$.

$$[6, 8] \cup [2, 7) = [2, 8] = 2 \leq x \leq 8$$

$[6, 8] \cap [2, 7)$ is the intersection of elements in the sets $[6, 8] = 6 \leq x \leq 8$ and $[2, 7) = 2 \leq x < 7$.

$$[6, 8] \cap [2, 7) = [6, 7) = 6 \leq x < 7$$

$[0, 1]^c$ is the set of elements in \mathbb{R} that do not lie in $[0, 1]$.

$$[0, 1]^c = (-\infty, 0) \cup (1, \infty)$$

$[6, 8] - (2, 7)$ is the set of elements in $[6, 8]$ that do not also lie in $(2, 7)$.

$$[6, 8] - (2, 7) = [7, 8] = 7 \leq x \leq 8$$