1

a $A' = \{4\}$

b $B' = \{1, 3, 5\}$

c $A \cup B = \{1, 2, 3, 4, 5\}$, or ξ

d $(A \cup B)' = \varnothing$
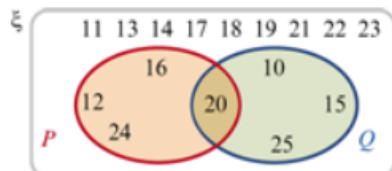
e $A' \cap B' = \varnothing$

2

a $P' = \{1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16\}$

b $Q' = \{1, 3, 5, 7, 9, 11, 13, 15\}$

c $P \cup Q = \{2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16\}$

d $(P \cup Q)' = \{1, 5, 7, 11, 13\}$

e $P' \cap Q' = \{1, 5, 7, 11, 13\}$

3
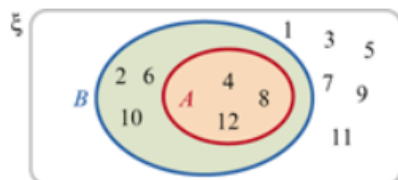
a $A' = \{1, 2, 3, 5, 6, 7, 9, 10, 11\}$

b $B' = \{1, 3, 5, 7, 9, 11\}$

c $A \cup B = \{2, 4, 6, 8, 10, 12\}$

d $(A \cup B)' = \{1, 3, 5, 7, 9, 11\}$

e $A' \cap B' = \{1, 3, 5, 7, 9, 11\}$
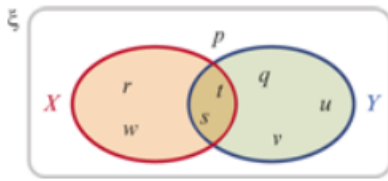
4

a $P' = \{10, 11, 13, 14, 15, 17, 18, 19, 21, 22, 23, 25\}$

b $Q' = \{11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24\}$

c $P \cup Q = \{10, 12, 15, 16, 20, 24, 25\}$

d $(P \cup Q)' = \{11, 13, 14, 17, 18, 19, 21, 22, 23\}$

e $P' \cap Q' = \{11, 13, 14, 17, 18, 19, 21, 22, 23\}$

5

a $X' = \{p, q, u, v\}$

b $Y' = \{p, r, w\}$

c $X' \cap Y' = \{p\}$

d $X' \cup Y' = \{p, q, r, u, v, w\}$

e $X \cup Y = \{q, r, s, t, u, v, w\}$

f $(X \cup Y)' = \{p\}$ **c** and **f** are equal.

6

a $X' = \{5, 7, 8, 9, 10, 11\}$
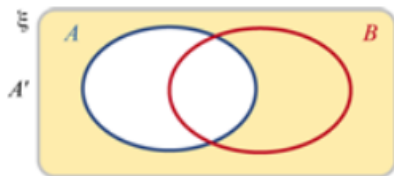
b $Y' = \{1, 3, 5, 7, 9, 11\}$

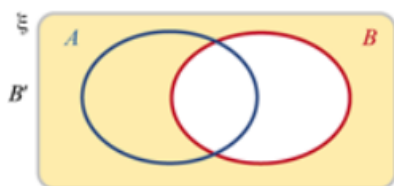**c** $X' \cup Y' = \{1, 3, 5, 7, 8, 9, 10, 11\}$

d $X' \cap Y' = \{1, 3, 5, 7, 8, 9, 10, 11\}$
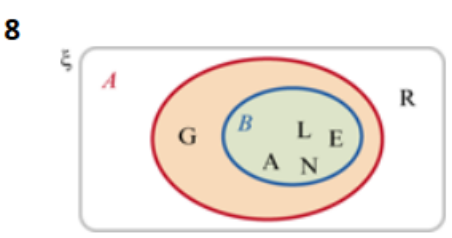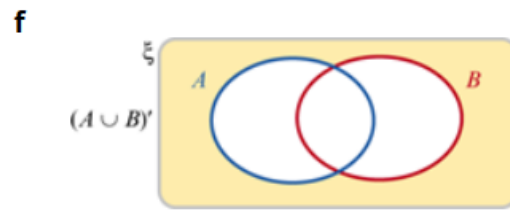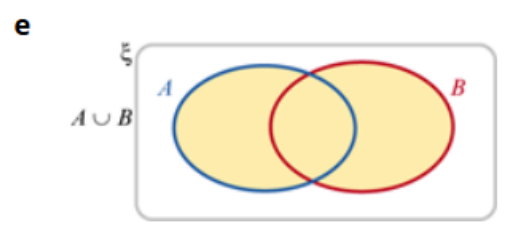
e $X \cup Y = \{1, 2, 3, 4, 6, 8, 10, 12\}$

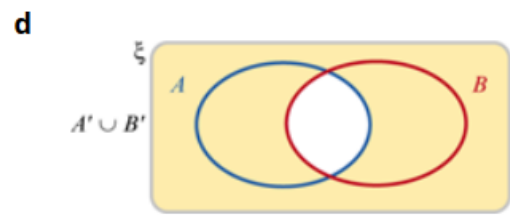**f** $(X \cup Y)' = \{5, 7, 9, 11\}$ **d** and **f** are equal.

7 a

b

c

$A' \cap B'$

d

$A' \cup B'$

e

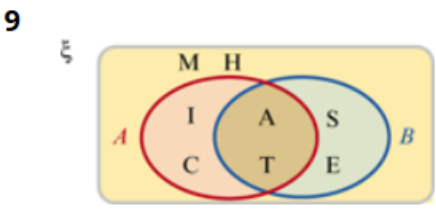$A \cup B$

f

$(A \cup B)'$

8
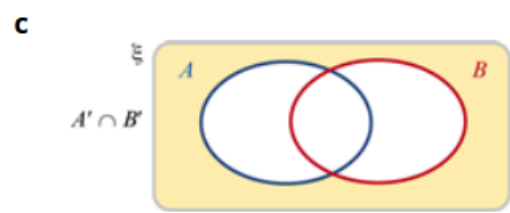
a $A' = \{R\}$

b $B' = \{G, R\}$

c $A \cap B = \{L, E, A, N\}$

d $A \cup B = \{A, N, G, E, L\}$

e $(A \cup B)' = \{R\}$

f $A' \cup B' = \{G, R\}$

9

a $A' = \{E, H, M, S\}$

b $B' = \{C, H, I, M\}$

c $A \cap B = \{A, T\}$

d $(A \cup B)' = \{H, M\}$

e $A' \cup B' = \{C, E, H, I, M, S\}$

f $A' \cap B' = \{H, M\}$