

2.1.1. Each of four transmitted bits is classified as either in error or not in error.

Let e and o denote a bit in error and not in error (o denotes okay), respectively.

$$S = \left\{ \begin{array}{l} eeee, eoeo, oeee, ooeo, \\ eeeo, eoeo, oeeo, ooeo, \\ eoeo, eooo, oeeo, oooo, \\ eooo, eooo, oeeo, oooo \end{array} \right\}$$

2.1.4. An ammeter that displays three digits is used to measure current in milliamperes.

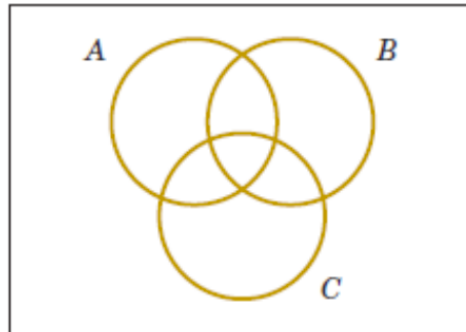
A vector with three components can describe the three digits of the ammeter. Each digit can be 0,1,2,...,9.

The sample space S is 1000 possible three digit integers, $S = \{000, 001, \dots, 999\}$

2.1.11. Calls are repeatedly placed to a busy phone line until a connection is achieved.

Let c and b denote connect and busy, respectively. Then $S = \{c, bc, bbc, bbbc, \dots\}$

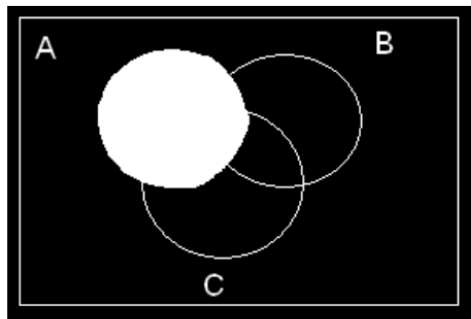
2.1.13. Three events are shown on the Venn diagram in the following figure:



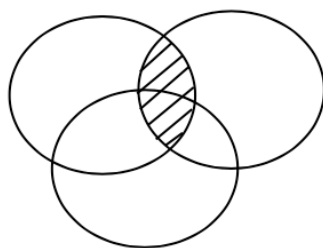
Reproduce the figure and shade the region that corresponds to each of the following events.

(a) A' (b) $A \cap B$ (c) $(A \cap B) \cup C$ (d) $(B \cup C)'$ (e) $(A \cap B)' \cup C$

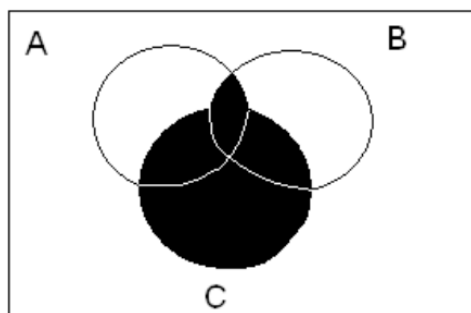
(a)



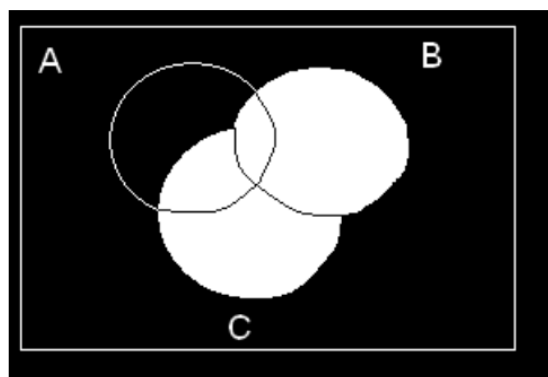
(b)



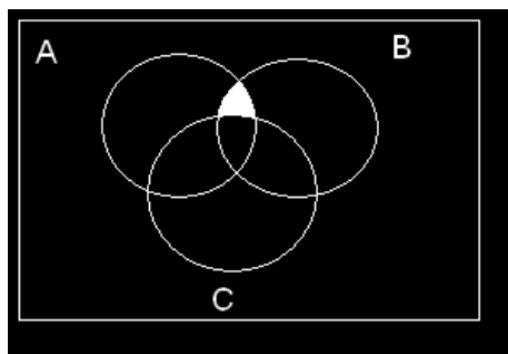
(c)



(d)



(e)



2.1.15. A digital scale that provides weights to the nearest gram is used.

(a) What is the sample space for this experiment?

Let A denote the event that a weight exceeds 11 grams, let B denote the event that a weight is less than or equal to 15 grams, and let C denote the event that a weight is greater than or equal to 8 grams and less than 12 grams.

Describe the following events.

(b) $A \cup B$ (c) $A \cap B$ (d) A' (e) $A \cup B \cup C$ (f) $(A \cup C)'$ (g) $A \cap B \cap C$ (h) $B' \cap C$ (i) $A \cup (B \cap C)$

(a) Let S = the nonnegative integers from 0 to the largest integer that can be displayed by the scale.

Let X denote the weight.

A is the event that $X > 11$

B is the event that $X \leq 15$

C is the event that $8 \leq X < 12$

$S = \{0, 1, 2, 3, \dots\}$

(b) S

(c) $11 < X \leq 15$ or $\{12, 13, 14, 15\}$

(d) $X \leq 11$ or $\{0, 1, 2, \dots, 11\}$

(e) S

(f) $A \cup C$ contains the values of X such that: $X \geq 8$

Thus $(A \cup C)'$ contains the values of X such that: $X < 8$ or $\{0, 1, 2, \dots, 7\}$

(g) \emptyset

(h) B' contains the values of X such that $X > 15$. Therefore, $B' \cap C$ is the empty set. They have no outcomes in common or \emptyset .

(i) $B \cap C$ is the event $8 \leq X < 12$. Therefore, $A \cup (B \cap C)$ is the event $X \geq 8$ or $\{8, 9, 10, \dots\}$