

## 1.4 Law of Addition and Set Notation

Suppose 55% of people exercise and 45% drink alcohol. Also, 70% do at least one of these.

What is the probability that a randomly selected person:

1. exercises and drinks alcohol?

This can be solved with the formula for union that we used in 1.2:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Where,

$P(A)$  is the probability that the person exercises

$P(B)$  is the probability that the person drinks alcohol

$$0.70 = 0.55 + 0.45 - P(A \cap B)$$

Rearranging,

$$P(A \cap B) = 0.30$$

Therefore, the probability that a randomly selected person exercises and drinks alcohol is 30%.

2. does not do at least one of the two activities?

To find the probability that a person does neither, we can subtract the probability of the union of the set from one:

$$P((A \cup B)^c) = 1 - P(A \cup B)$$

Since we know the value of the union set:

$$0.30 = 1 - 0.70$$

The probability that a person neither exercises or drinks alcohol is 30%.