

## Class Exercise

### 1. Three events

Let  $A$ ,  $B$  and  $C$  be three events such that  $A$  is mutually exclusive from both  $B$  and  $C$ ,  $P(A) = 0.2$ ,  $P(B) = 0.4$ ,  $P(C) = 0.6$  and  $P(B \cap C) = 0.3$ . Determine the following probabilities

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

### 2. Dr. Newbee

Phyllis feels numbness and tingling in some of the digits on her left foot. She visits her newly minted family physician, Dr. Newbee, and presents the symptoms. Dr. Newbee googles the symptoms and finds that two not mutually exclusive conditions,  $A$  and  $B$ , are possible. The prevalence of these conditions in the general population is as follows:  $p(A) = 0.45$ ,  $p(B) = 0.39$  and  $p(A \cap B) = 0.04$ . 36% of patients with condition  $A$  only show the symptoms, 90% of patients with condition  $B$  only show the symptoms, 99% of the patients afflicted by both conditions show the symptoms and 12% of patients who are not afflicted with either of the two conditions have these symptoms.

- (a) What is the probability that Phyllis suffers from only condition  $A$ ?
- (b) What is the probability that Phyllis is not afflicted with either of the two conditions  $A, B$  despite the symptoms?
- (c) Determine the probability that a randomly chosen person from the population is not afflicted by both conditions, given that he or she is afflicted by at least one of the two conditions.