3. (a) Explain the motivations for the simplification of logical expressions. [4]

(b) Karnaugh maps and Boolean algebra can both be used to simplify logical expressions, such as the ones shown below.

$$F = \bar{A}.\bar{B}.\bar{C} + \bar{A}.\bar{B}.C + \bar{A}.B.\bar{C} + A.B.\bar{C} + A.B.C$$

   i. Simplify F using Karnaugh maps or Boolean algebra. [9]
   ii. Design a logic circuit that implements F. [8]

(c) Comment on the advantages and disadvantages of using a Karnaugh map to simplify a logical expression instead of Boolean algebra. [4]