(a) Outline the steps involved in proving a specification \( \{P\} C \{Q\} \) using the method of verification conditions. [6 marks]

(b) The familiar algorithm for generating verification conditions assumes that an annotation is added before a command \( C_2 \) in a sequence \( C_1; C_2 \) unless \( C_2 \) is an assignment. Extend this algorithm so that no annotation is required if \( C_2 \) is of the form \( \text{IF } B \text{ THEN } X_1 := E_1 \text{ ELSE } X_2 := E_2 \). [6 marks]

(c) Justify your extended algorithm by showing that if the verification conditions it generates from \( \{P\} C; \text{IF } B \text{ THEN } X_1 := E_1 \text{ ELSE } X_2 := E_2 \{Q\} \) are provable, then \( \vdash \{P\} C; \text{IF } B \text{ THEN } X_1 := E_1 \text{ ELSE } X_2 := E_2 \{Q\} \). [8 marks]