(a) State and explain Hoare’s assignment axiom for simple assignments $V := E$, where $V$ is a variable. [5 marks]

(b) Is Hoare’s assignment axiom valid for assignments $V := E$ if the expression $E$ can have side effects? Justify your answer. [5 marks]

(c) State and explain the assignment axiom for array assignments $V(E_1) := E_2$, where $V$ is an array variable. [5 marks]

(d) The following alternative “forward” rule for assignments has been proposed:

$$\vdash \{P\} V := E \{ \exists v. V = E[v/V] \land P[v/V] \}$$

Explain informally why this rule is valid. [5 marks]