

Axiomatic Semantics (Partial Correctness)

$$\frac{}{\{\underline{P}\} \text{ skip } \{\underline{P}\}} (\text{SKIP}_{Ax}) \quad \frac{}{\{\underline{P}[x \mapsto e]\} x := e \{\underline{P}\}} (\text{ASS}_{Ax})$$

$$\frac{\{\underline{P}\} \underline{s}_1 \{\underline{R}\} \quad \{\underline{R}\} \underline{s}_2 \{\underline{Q}\}}{\{\underline{P}\} \underline{s}_1; \underline{s}_2 \{\underline{Q}\}} (\text{SEQ}_{Ax})$$

$$\frac{\{\underline{b} \wedge \underline{P}\} \underline{s}_1 \{\underline{Q}\} \quad \{\neg \underline{b} \wedge \underline{P}\} \underline{s}_2 \{\underline{Q}\}}{\{\underline{P}\} \text{ if } \underline{b} \text{ then } \underline{s}_1 \text{ else } \underline{s}_2 \text{ end } \{\underline{Q}\}} (\text{IF}_{Ax})$$

$$\frac{\{\underline{b} \wedge \underline{P}\} \underline{s} \{\underline{P}\}}{\{\underline{P}\} \text{ while } \underline{b} \text{ do } \underline{s} \text{ end } \{\neg \underline{b} \wedge \underline{P}\}} (\text{WH}_{Ax})$$

$$\frac{\{\underline{P}'\} \underline{s} \{\underline{Q}'\}}{\{\underline{P}\} \underline{s} \{\underline{Q}\}} (\text{CONS}_{Ax}) \quad \text{if } \underline{P} \models \underline{P}' \text{ and } \underline{Q}' \models \underline{Q}$$

Axiomatic Semantics (Total Correctness)

Rules are as for partial correctness above, except for the following rule, which replaces WH_{Ax} :

$$\frac{\{\underline{b} \wedge \underline{P} \wedge e = Z\} \underline{s} \{\downarrow \underline{P} \wedge e < Z\}}{\{\underline{P}\} \text{ while } \underline{b} \text{ do } \underline{s} \text{ end } \{\downarrow \neg \underline{b} \wedge \underline{P}\}} (\text{WHTOT}_{Ax}) \quad \text{if } \underline{b} \wedge \underline{P} \models 0 \leq e$$

where Z is a fresh logical variable (not used in \underline{P}).