4 Handout — Hoare Logic Rules

- Precondition Strengthening:

$$\frac{P_s \Rightarrow P_w \qquad \{P_w\}\ S\ \{Q\}}{\{P_s\}\ S\ \{Q\}}$$

- Postcondition Weakening:

$$\frac{\{P\}\ S\ \{Q_s\} \qquad Q_s \Rightarrow Q_w}{\{P\}\ S\ \{Q_w\}}$$

- Assignment:

$$\{Q(e)\}\ \texttt{x := e}\ \{Q(x)\}$$

- Sequence:

$$\frac{\{P\}\ S_1\ \{Q\} \qquad \{Q\}\ S_2\ \{R\}}{\{P\}\ S_1;\ S_2\ \{R\}}$$

- Conditional:

$$\frac{\{P \wedge b\}\ S_1\ \{Q\} \qquad \{P \wedge \neg b\}\ S_2\ \{Q\}}{\{P\}\ \textbf{if}\ b\ \textbf{then}\ S_1\ \textbf{else}\ S_2\ \{Q\}}$$

- While Loop:

$$\frac{\{P \wedge b\}\ S\ \{P\}}{\{P\}\ \textbf{while}\ b\ \textbf{do}\ S\ \{P \wedge \neg b\}}$$