1. Use **forward** reasoning to determine the value of \( z \) at the end in terms of \( x \) and \( y \).
   ```
   // x > 0 and y > 0
   w = x * y;
   //___________________________________________________
   q = x * x;
   //___________________________________________________
   z = w / q;
   //___________________________________________________
   ```

2. Use **forward** reasoning to find the possible values of \( z \) by the end of the code.
   ```
   // x >= 0 and y >= 0
   y = 25;
   //___________________________________________________
   x = x + y;
   //___________________________________________________
   x = sqrt(x);
   //___________________________________________________
   z = y - x;
   //___________________________________________________
   ```

3. Use **forward** reasoning to determine what the possible values of \( z \) are by the end.
   ```
   // x != 0 and y < 0
   z = x * x;
   //___________________________________________________
   z = z * y;
   //___________________________________________________
   z = z * x;
   //___________________________________________________
   ```

4. Use **backward** reasoning to find the sufficient conditions for \( z \neq -1 \) at the end.
   ```
   //___________________________________________________
   x = y / 2;
   //___________________________________________________
   z = x * 2;
   //___________________________________________________
   z = z + 1;
   // z != -1
   ```
5. Use **backward** reasoning to determine what must be true initially for \( y > 20 \) at the end.

\[
x = 1 - x; \\
x = x + 10; \\
y = 2 * x;
\]

// y > 20

6. Use **backward** reasoning to find what must be true for \( x > y \) and \( y > z \) at the end.

\[
b = -b; \\
z = a * 2; \\
x = b + 4; \\
y = a + b;
\]

// x > y and y > z

7. Prove that the following code calculates the absolute value of \( x \).

\[
\text{if } (x > 0) \{ \\
\quad \text{abs} = x; \\
\} \\
\text{else} \{ \\
\quad \text{abs} = -x; \\
\}
\]

// abs = \(|x|\)