Lab Sheet 3 Answers

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We will indicate the value of the variable a after the n^{th} iteration of the loop body using a subscript, or none if it's value doesn't change throughout the program. e.g.

y_4 is the value of y after the loop body has been executed 4 times.

0.0.1 Hypothesis

We want to show that:

$\forall x.\forall y_0.(x > 0 \land y_0 > 0) \rightarrow z_n = x^{y_0}$

$$\frac{x > 0 \quad y_0 > 0}{z_n = x^{y_0}}$$

0.0.2 Proof

By inspection of the code:

1. $z_0 = x$
2. $x_i = x$
3. $z_{i+1} = z_i \times x$
4. $y_{i+1} = y_i - 1$

Perform induction over y_0. Base case. Let $y = 1$
$(x > 0 \land 1 > 0) \rightarrow z_n = x^1$