Appendix

A TRANSFORMATION RULES

- **Loop Remover**:
  for(x *in range*) $b \mapsto$ *skip*

- **Loop Var Remover**:
  for(x *in range*) $b \mapsto b[x/c]$
  where $c \in$ *range*

- **Conditional Remover**:
  if(*expr*) then b else $b' \mapsto b$
  if(*expr*) then b else $b' \mapsto b'$

- **Function Statement Remover**:
  $func(e_1, ...) \mapsto$ *skip*

- **Assignment Remover**:
  $x = expr \mapsto$ *skip*
  if $uses(a1) == 0$

- **Sampling Remover**:
  $x := dist(e_1, ...) \mapsto$ *skip*
  if $uses(x) == 0$

- **Observe Remover:**
  observe$(dist(e_1, ...), x) \mapsto$ *skip*

- **Arithmetic Simplifier**:
  $a\ op\ b \mapsto a$
  $a\ op\ b \mapsto b$
  $a\ op\ b \mapsto c$
  where $op \in \{+, -, *, /, \hat{}\}$ and $c \in \mathbb{Z}$ or $c \in \mathbb{R}$

- **Data Reducer**:
  $D : [d_1, ..., d_N] \mapsto D : [d_1, ..., d_m]$
  where $m = N/2$
  $D : [d_1, ..., d_N] \mapsto D : [d_{m+1}, ..., d_N]$
  where $m = \lfloor N/2 \rfloor$

- **Parameter Remover**:
  $p := dist(p_1, ..p_N) \mapsto$ *skip* $\wedge$
  $q = expr\ op\ p \mapsto q = expr\ op\ c\ \wedge$
  $p : type \mapsto$ *skip*
  where $c \in support(dist)$, op $\in \{+, -, *, /, \hat{}\}$, and, $p, q \in Vars$

- **Math-Function Call Remover**:
  $x = func(e_1, ...) \mapsto x = c$
  where $c \in range(func)$

- **Unused Item Remover**:
  $x : [c+] \mapsto$ *skip* if $uses(x) == 0$
  $x : type \mapsto$ *skip* if $uses(x) == 0$
  $x : expr \mapsto$ *skip* if $uses(x) == 0$

- **Distribution Simplifier**:
  $p := dist(e_1, ..., e_N) \mapsto p := dist'(f_1, ..., f_M)$
  where *dist* and *dist*$'$ have same support

- **Limits Remover**:
  $x : type\ limits \mapsto x : type$

- **Inference Argument Reducer (Sampling)**:
  $Infer(p_1, p_2, ..., p_N, iters_1) \mapsto Infer(p_1, p_2, ..., p_N, iters_2)$
  where $iters_2 = \lfloor iters_1/2 \rfloor$