Algorithm 2 User questions generation.

Input: seed S, conversation plan p, number of questions per iteration I, generator G
Output: Question set Q

$p \leftarrow \{p_1, \ldots, p_N\}$ ▷ Conversation plan with N sub-plans
$Q \leftarrow \{\}$ ▷ Initialize empty question set
for each $p_i \in P$ **do**
  $p_i = \{p_{i1}, \ldots, p_{iK}\}$
  for each $p_{ij} \in p_i$ **do**
    $Q_{ij} \leftarrow G(S, p_{ij}, \{p_{i1}, \ldots, p_{i(j-1)}\}, \{p_1, \ldots, p_{i-1}\}, \text{I})$ ▷ Generate I questions using Listing 32
    $Q \leftarrow Q \cup \{Q_{ij}\}$ ▷ Append generated questions to the question set
  end for
end for
return Q

Algorithm 3 Answer generation.

Input: question set $Q = \{Q_1, \ldots, Q_N\}$, seed S, conversation plan set P, thresholds δ_1, δ_2, assistant-question detector ϕ, follow-up detector ψ, generator G
Output: conversation list T

$\mathcal{T} \leftarrow \{\}$ ▷ Initialize empty conversation list
for each $Q_i \in Q$ **do**
  $Q_i = \{q_1, \ldots, q_J\}$ ▷ Questions in sub-plan i
  for each $q_j \in Q_i$ **do**
    $t \leftarrow \{\}$ ▷ Initialize turn sequence
    $H_t^{(M)} \leftarrow$ recent-M turn window at turn t
    $\overline{H}_t \leftarrow$ summary of turns prior to $H_t^{(M)}$
    $\overline{P}^{(<p)} \leftarrow$ summaries of conversation plans preceding p
    $a_{ij} \leftarrow G_{\text{assistant}}(S, p_{1:(i-1)}, H_t^{(M)}, \overline{H}_t, \overline{P}^{(<p)})$ ▷ Generate assistant response with Listing 37
    $t \leftarrow t \cup \{a_{ij}\}$ ▷ Add assistant's response to current dialogues turn
    $isQ \leftarrow \phi(a_{ij}, H_t^{(M)}, \overline{H}_t)$ ▷ Checks if assistant response contains question from user with Listing 35
    $count \leftarrow 0$
    while isQ **and** $count < \delta_1$ **do**
      $u_{ij} \leftarrow G_{\text{user}}(S, p_i, p_{1:(i-1)}, \overline{P}^{(<p)}, H_t^{(M)}, \overline{H}_t, a_{ij})$ ▷ Generate user's response to assistant question with Listing 38
      $t \leftarrow t \cup \{u_{ij}\}$ ▷ Add user's response to current dialogues turn
      $a_{ij} \leftarrow G_{\text{assistant}}(S, p_{1:(i-1)}, H_t^{(M)}, \overline{H}_t, \overline{P}^{(<p)})$ ▷ Generate assistant's response
      $t \leftarrow t \cup \{a_{ij}\}$ ▷ Add assistant's response to current dialogues turn
      $count \leftarrow count + 1$
      $isQ \leftarrow \phi(a_{ij}, H_t^{(M)}, \overline{H}_t)$
    end while
    $needFU \leftarrow \psi(a_{ij}, H_t^{(M)}, \overline{H}_t, S)$ ▷ Checks if user need to ask followup question with Listing 36
    $fu\_count \leftarrow 0$
    while $needFU$ **and** $fu\_count < \delta_2$ **do**
      $u_{ij} \leftarrow G_{\text{user}}(S, p_i, p_{1:(i-1)}, \overline{P}^{(<p)}, H_t^{(M)}, \overline{H}_t, a_{ij})$ ▷ Generate user's followup question with Listing 39
      $t \leftarrow t \cup \{u_{ij}\}$
      $a_{ij} \leftarrow G_{\text{assistant}}(S, p_{1:(i-1)}, H_t^{(M)}, \overline{H}_t, \overline{P}^{(<p)})$ ▷ Generate assistant's response to user's followup question
      $t \leftarrow t \cup \{a_{ij}\}$
      $fu\_count \leftarrow fu\_count + 1$
      $needFU \leftarrow \psi(a_{ij}, H_t^{(M)}, \overline{H}_t, S)$
    end while
    $\mathcal{T} \leftarrow \mathcal{T} \cup \{t\}$
  end for
end for
return T