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This exercise is based on Thompson's 1984 Turing Award lecture.[1]

1. List the members of your group below. Underline your name.

2. The seven figures in Thompson's paper (Figures 1, **2.2**, **2.1**, 2.3, 3.1, 3.2, and 3.3) suggest seven C programs (say, P1, P2.2, P2.1, P2.3, P3.1, P3.2, and P3.3). Indicate which of these programs (if any) will **not** compile successfully using a standard C compiler (such as gcc) and explain your answer briefly.

3. The parenthetical remark in the last paragraph on page 761 of Thompson's paper suggests that output of the program in Figure 1 in that paper differs from the program's listing in Figure 1. Explain this difference as precisely as you can. (Assume that the text "`(213 lines deleted)`" has been replaced by the appropriate text suggested by the comment in the listing, and ignore the explanatory material following the last closing brace.) Hint: There are differences other than white-space differences.

[1] Ken Thompson, "Reflections on Trusting Trust," *Communications of the ACM* 27/8 (1984).

4. Suppose file `c1.c` contains the complete source code of a typical C compiler, as suggested by Figure 2.2 in Thompson's paper.[2] Suppose `c2.c` is a modified version of `c1.c` in which the special character code `\v` is implemented as suggested by Figure 2.1. Similarly, suppose file `c3.c` contains a modified version of `c1.c` in which the character code `\v` is implemented as suggested by Figure 2.3.

   Let $E(c, p)$ be the result (executable code) of compiling file p (source code) with compiler c (executable code). If compiler c generates a compile-time error on input p then $E(c, p)$ is undefined.

   Assume that an executable $\texttt{c1} = E(\texttt{c1}, \texttt{c1.c})$ is initially available.

   For each of the following compilations, indicate whether there is any error, *explaining each answer briefly.*

   (a) $E(\texttt{c1}, \texttt{c2.c})$

   (b) $E(\texttt{c1}, \texttt{c3.c})$

   (c) $E(E(\texttt{c1}, \texttt{c2.c}), \texttt{c1.c})$

   (d) $E(E(\texttt{c1}, \texttt{c2.c}), \texttt{c2.c})$

   (e) $E(E(\texttt{c1}, \texttt{c2.c}), \texttt{c3.c})$

   (f) $E(E(\texttt{c1}, \texttt{c3.c}), \texttt{c1.c})$

   (g) $E(E(\texttt{c1}, \texttt{c3.c}), \texttt{c2.c})$

   (h) $E(E(\texttt{c1}, \texttt{c3.c}), \texttt{c3.c})$

   (i) $E(E(E(\texttt{c1}, \texttt{c3.c}), \texttt{c2.c}), \texttt{c2.c})$

   (j) $E(E(E(E(\texttt{c1}, \texttt{c3.c}), \texttt{c2.c}), \texttt{c2.c}), \texttt{c3.c})$

[2] *Idem*, Figures 2.1 and 2.2 appear out of order in the paper.