

Given a set of rules and facts, you have to reason whether a statement is true or false. Here are some facts and rules:

- F1:  $r1(\text{angelina}, \text{michael})$ .
- F2:  $r1(\text{angelina}, \text{jan})$ .
- F3:  $r1(\text{angelina}, \text{jonathan})$ .
- F4:  $r1(\text{emily}, \text{katharina})$ .
- F5:  $r1(\text{emily}, \text{adam})$ .
- F6:  $r1(\text{nora}, \text{theodor})$ .
- F7:  $r1(\text{jan}, \text{lea})$ .
- F8:  $r1(\text{magdalena}, \text{angelina})$ .
- F9:  $r1(\text{matthias}, \text{angelina})$ .
- F10:  $r1(\text{nico}, \text{sebastian})$ .
- F11:  $r1(\text{claudia}, \text{sebastian})$ .
- F12:  $r1(\text{emil}, \text{michael})$ .
- F13:  $r1(\text{emil}, \text{jan})$ .
- F14:  $r1(\text{emil}, \text{jonathan})$ .
- F15:  $r1(\text{alina}, \text{lea})$ .
- F16:  $r1(\text{patrick}, \text{theodor})$ .
- F17:  $r1(\text{theodor}, \text{leon})$ .
- F18:  $r1(\text{vanessa}, \text{leon})$ .
- F19:  $r1(\text{jonathan}, \text{katharina})$ .
- F20:  $r1(\text{jonathan}, \text{adam})$ .
- F21:  $r1(\text{valentina}, \text{nora})$ .
- F22:  $r1(\text{valentina}, \text{emil})$ .
- F23:  $r1(\text{stefan}, \text{nora})$ .
- F24:  $r1(\text{stefan}, \text{emil})$ .
- F25:  $r1(\text{selina}, \text{nico})$ .
- F26:  $r1(\text{selina}, \text{jonas})$ .
- F27:  $r1(\text{selina}, \text{stefan})$ .
- F28:  $r1(\text{marko}, \text{nico})$ .
- F29:  $r1(\text{marko}, \text{jonas})$ .
- F30:  $r1(\text{marko}, \text{stefan})$ .
- F31:  $r1(\text{helga}, \text{selina})$ .
- F32:  $r1(\text{simon}, \text{selina})$ .
- F33:  $r43(\text{michael})$ .

F34:  $r44(\text{angelina})$ .

F35:  $r43(\text{emil})$ .

F36:  $r43(\text{jonathan})$ .

F37:  $r44(\text{valentina})$ .

F38:  $r43(\text{stefan})$ .

F39:  $r44(\text{selina})$ .

F40:  $r43(\text{marko})$ .

F41:  $r44(\text{helga})$ .

F42:  $r43(\text{simon})$ .

F43:  $r44(\text{emily})$ .

F44:  $r44(\text{katharina})$ .

F45:  $r44(\text{nora})$ .

F46:  $r43(\text{jan})$ .

F47:  $r44(\text{magdalena})$ .

F48:  $r43(\text{matthias})$ .

F49:  $r43(\text{nico})$ .

F50:  $r43(\text{adam})$ .

F51:  $r44(\text{claudia})$ .

F52:  $r43(\text{sebastian})$ .

F53:  $r44(\text{alina})$ .

F54:  $r44(\text{lea})$ .

F55:  $r43(\text{patrick})$ .

F56:  $r43(\text{theodor})$ .

F57:  $r43(\text{jonas})$ .

F58:  $r44(\text{vanessa})$ .

F59:  $r43(\text{leon})$ .

L1:  $\forall A, B, C : r1(B, A) \wedge r1(B, C) \wedge r44(A) \rightarrow r2(A, C)$

L2:  $\forall A, B, C : r1(B, A) \wedge r1(B, C) \wedge r43(A) \rightarrow r3(A, C)$

L3:  $\forall A, B : r1(A, B) \wedge r44(A) \rightarrow r4(A, B)$

L4:  $\forall A, B : r1(A, B) \wedge r43(A) \rightarrow r5(A, B)$

L5:  $\forall A, B, C : r1(A, B) \wedge r1(B, C) \wedge r44(A) \rightarrow r6(A, C)$

L6:  $\forall A, B, C : r1(A, B) \wedge r1(B, C) \wedge r43(A) \rightarrow r7(A, C)$

L7:  $\forall A, B, C, D : r1(A, B) \wedge r1(B, C) \wedge r1(C, D) \wedge r44(A) \rightarrow r8(A, D)$

L8:  $\forall A, B, C, D : r1(A, B) \wedge r1(B, C) \wedge r1(C, D) \wedge r43(A) \rightarrow r9(A, D)$

L9:  $\forall A, B, C, D : r1(B, A) \wedge r1(B, C) \wedge r1(C, D) \wedge r44(A) \rightarrow r10(A, D)$

- L10:  $\forall A, B, C, D : r1(B, A) \wedge r1(B, C) \wedge r1(C, D) \wedge r43(A) \rightarrow r11(A, D)$
- L11:  $\forall A, B, C, D, E : r1(B, A) \wedge r1(B, C) \wedge r1(C, D) \wedge r1(D, E) \wedge r44(A) \rightarrow r12(A, E)$
- L12:  $\forall A, B, C, D, E : r1(B, A) \wedge r1(B, C) \wedge r1(C, D) \wedge r1(D, E) \wedge r43(A) \rightarrow r13(A, E)$
- L13:  $\forall A, B, C, D, E, F : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r1(D, E) \wedge r1(E, F) \wedge r44(A) \rightarrow r14(A, F)$
- L14:  $\forall A, B, C, D, E, F : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r1(D, E) \wedge r1(E, F) \wedge r43(A) \rightarrow r15(A, F)$
- L15:  $\forall A, B, C, D, E : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r1(D, E) \wedge r44(A) \rightarrow r16(A, E)$
- L16:  $\forall A, B, C, D, E : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r1(D, E) \wedge r43(A) \rightarrow r17(A, E)$
- L17:  $\forall A, B, C, D, E, F, G : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r1(D, E) \wedge r1(E, F) \wedge r1(F, G) \wedge r44(A) \rightarrow r18(A, G)$
- L18:  $\forall A, B, C, D, E, F, G : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r1(D, E) \wedge r1(E, F) \wedge r1(F, G) \wedge r43(A) \rightarrow r19(A, G)$
- L19:  $\forall A, B, C, D, E, F : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r1(D, E) \wedge r1(E, F) \wedge r44(A) \rightarrow r20(A, F)$
- L20:  $\forall A, B, C, D, E, F : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r1(D, E) \wedge r1(E, F) \wedge r43(A) \rightarrow r21(A, F)$
- L21:  $\forall A, B : r1(B, A) \wedge r44(A) \rightarrow r22(A, B)$
- L22:  $\forall A, B : r1(B, A) \wedge r43(A) \rightarrow r23(A, B)$
- L23:  $\forall A, B, C : r1(B, A) \wedge r1(C, B) \wedge r44(A) \rightarrow r24(A, C)$
- L24:  $\forall A, B, C : r1(B, A) \wedge r1(C, B) \wedge r43(A) \rightarrow r25(A, C)$
- L25:  $\forall A, B, C, D : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r44(A) \rightarrow r26(A, D)$
- L26:  $\forall A, B, C, D : r1(B, A) \wedge r1(C, B) \wedge r1(D, C) \wedge r43(A) \rightarrow r27(A, D)$
- L27:  $\forall A, B, C, D : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r44(A) \rightarrow r28(A, D)$
- L28:  $\forall A, B, C, D : r1(B, A) \wedge r1(C, B) \wedge r1(C, D) \wedge r43(A) \rightarrow r29(A, D)$

Does it imply that the statement “ $r11(\text{jan, patrick})$ ” is True? If the statement is True, please answer with “True”. Otherwise, please answer with “False”.