

Exercise 2: The Royal Family

The old Royal succession rule states that the throne is passed down along the male line according to the order of birth before the consideration along the female line – similarly according to the order of birth. queen elizabeth, the monarch of United Kingdom, has four offsprings; namely:- prince charles, princess ann, prince andrew and prince edward – listed in the order of birth.

1. Define their relations and rules in a Prolog rule base. Hence, define the old Royal succession

Prolog Rules in Knowledge Base

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% Define gender
female(queen_elizabeth).
female(princess_ann).
male(prince_charles).
male(prince_andrew).
male(prince_edward).

% Define current crown
crown(queen_elizabeth).

% Define parent relationships
parent(queen_elizabeth, prince_charles).
parent(queen_elizabeth, princess_ann).
parent(queen_elizabeth, prince_andrew).
parent(queen_elizabeth, prince_edward).

% Define birth order
% born_after(X,Y) --> X is born before Y --> X is older than Y
born_after(queen_elizabeth, prince_charles).
born_after(prince_charles, princess_ann).
born_after(princess_ann, prince_andrew).
born_after(prince_andrew, prince_edward).

% Determining birth born_after transitivity
born_after_x(A,B) :- born_after(A,B).

born_after_x(A,C) :-
    born_after(A,B), born_after_x(B,C).

% Checks if same gender
same_gender(X,Y) :- (male(X), male(Y)); (female(X), female(Y)).
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% Ensures same gender, and second arg is younger sibling
same_g_younger(X,Y) :- same_gender(X,Y), born_after_x(X, Y).

% Ensures that the first arg is male and second arg is female.
diff_g(X,Y) :- male(X), female(Y).

% Checks for the valid order of the n^th item and the (n+1)^th item
get_order(List, Number) :- length(List, Number), order(List).
order([H,SIT]) :- order_r(H, [S,T]).
order([H,T]) :- order_r(H, [T]).
order([_]).
order([]).

% Ensures that n^th and (n+1)^th follows the royal rule
order_r_helper(X,Y) :-
    (same_g_younger(X,Y); diff_g(X,Y)),
    not(crown(X)),
    not(crown(Y)).

% Recursive call for (n+1)^th item onwards
order_r(H, [S,T]) :-
    order_r_helper(H,S), order_r(S,T).

order_r(H,T) :- order_r_helper(H, T).

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Trace Results

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?- get_order(X, 4).
X = [prince_charles, prince_andrew, prince_edward, princess_ann] .

?- trace.
true.

[trace] ?- get_order(X, 4).
Call: (10) get_order(_30534, 4) ? creep
Call: (11) length(_30534, 4) ? creep
Exit: (11) length(_32646, _32652, _32658, _32664, 4) ? creep
Call: (11) order(_32646, _32652, _32658, _32664) ? creep
Call: (12) order_r(_32646, [_32652, [_32658, _32664]]) ? creep
Call: (13) order_r_helper(_32646, _32652) ? creep
Call: (14) same_g_younger(_32646, _32652) ? creep
Call: (15) same_gender(_32646, _32652) ? creep
Call: (16) male(_32646) ? creep
Exit: (16) male(prince_charles) ? creep
Call: (16) male(_32652) ? creep
Exit: (16) male(prince_charles) ? creep
Exit: (15) same_gender(prince_charles, prince_charles) ? creep
Call: (15) born_after_x(prince_charles, prince_charles) ? creep

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Call: (16) born_after(prince_charles, prince_charles) ? creep
Fail: (16) born_after(prince_charles, prince_charles) ? creep
Redo: (15) born_after_x(prince_charles, prince_charles) ? creep
Call: (16) born_after(prince_charles, _44810) ? creep
Exit: (16) born_after(prince_charles, princess_ann) ? creep
Call: (16) born_after_x(princess_ann, prince_charles) ? creep
Call: (17) born_after(princess_ann, prince_charles) ? creep
Fail: (17) born_after(princess_ann, prince_charles) ? creep
Redo: (16) born_after_x(princess_ann, prince_charles) ? creep
Call: (17) born_after(princess_ann, _49672) ? creep
Exit: (17) born_after(princess_ann, prince_andrew) ? creep
Call: (17) born_after_x(prince_andrew, prince_charles) ? creep
Call: (18) born_after(prince_andrew, prince_charles) ? creep
Fail: (18) born_after(prince_andrew, prince_charles) ? creep
Redo: (17) born_after_x(prince_andrew, prince_charles) ? creep
Call: (18) born_after(prince_andrew, _54534) ? creep
Exit: (18) born_after(prince_andrew, prince_edward) ? creep
Call: (18) born_after_x(prince_edward, prince_charles) ? creep
Call: (19) born_after(prince_edward, prince_charles) ? creep
Fail: (19) born_after(prince_edward, prince_charles) ? creep
Redo: (18) born_after_x(prince_edward, prince_charles) ? creep
Call: (19) born_after(prince_edward, _59396) ? creep
Fail: (19) born_after(prince_edward, _59396) ? creep
Fail: (18) born_after_x(prince_edward, prince_charles) ? creep
Fail: (17) born_after_x(prince_andrew, prince_charles) ? creep
Fail: (16) born_after_x(princess_ann, prince_charles) ? creep
Fail: (15) born_after_x(prince_charles, prince_charles) ? creep
Redo: (16) male(_32652) ? creep
Exit: (16) male(prince_andrew) ? creep
Exit: (15) same_gender(prince_charles, prince_andrew) ? creep
Call: (15) born_after_x(prince_charles, prince_andrew) ? creep
Call: (16) born_after(prince_charles, prince_andrew) ? creep
Fail: (16) born_after(prince_charles, prince_andrew) ? creep
Redo: (15) born_after_x(prince_charles, prince_andrew) ? creep
Call: (16) born_after(prince_charles, _1706) ? creep
Exit: (16) born_after(prince_charles, princess_ann) ? creep
Call: (16) born_after_x(princess_ann, prince_andrew) ? creep
Call: (17) born_after(princess_ann, prince_andrew) ? creep
Exit: (17) born_after(princess_ann, prince_andrew) ? creep
Exit: (16) born_after_x(princess_ann, prince_andrew) ? creep
Exit: (15) born_after_x(prince_charles, prince_andrew) ? creep
Exit: (14) same_g_younger(prince_charles, prince_andrew) ? creep
^ Call: (14) not(crown(prince_charles)) ? creep
Call: (15) crown(prince_charles) ? creep
Fail: (15) crown(prince_charles) ? creep
^ Exit: (14) not(user:crown(prince_charles)) ? creep
^ Call: (14) not(crown(prince_andrew)) ? creep
Call: (15) crown(prince_andrew) ? creep
Fail: (15) crown(prince_andrew) ? creep
^ Exit: (14) not(user:crown(prince_andrew)) ? creep

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Exit: (13) order_r_helper(prince_charles, prince_andrew) ? creep
Call: (13) order_r(prince_andrew, [_90, _96]) ? creep
Call: (14) order_r_helper(prince_andrew, _90) ? creep
Call: (15) same_g_younger(prince_andrew, _90) ? creep
Call: (16) same_gender(prince_andrew, _90) ? creep
Call: (17) male(prince_andrew) ? creep
Exit: (17) male(prince_andrew) ? creep
Call: (17) male(_90) ? creep
Exit: (17) male(prince_charles) ? creep
Exit: (16) same_gender(prince_andrew, prince_charles) ? creep
Call: (16) born_after_x(prince_andrew, prince_charles) ? creep
Call: (17) born_after(prince_andrew, prince_charles) ? creep
Fail: (17) born_after(prince_andrew, prince_charles) ? creep
Redo: (16) born_after_x(prince_andrew, prince_charles) ? creep
Call: (17) born_after(prince_andrew, _26028) ? creep
Exit: (17) born_after(prince_andrew, prince_edward) ? creep
Call: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, prince_charles) ? creep
Fail: (18) born_after(prince_edward, prince_charles) ? creep
Redo: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, _30890) ? creep
Fail: (18) born_after(prince_edward, _30890) ? creep
Fail: (17) born_after_x(prince_edward, prince_charles) ? creep
Fail: (16) born_after_x(prince_andrew, prince_charles) ? creep
Redo: (17) male(_90) ? creep
Exit: (17) male(prince_andrew) ? creep
Exit: (16) same_gender(prince_andrew, prince_andrew) ? creep
Call: (16) born_after_x(prince_andrew, prince_andrew) ? creep
Call: (17) born_after(prince_andrew, prince_andrew) ? creep
Fail: (17) born_after(prince_andrew, prince_andrew) ? creep
Redo: (16) born_after_x(prince_andrew, prince_andrew) ? creep
Call: (17) born_after(prince_andrew, _39794) ? creep
Exit: (17) born_after(prince_andrew, prince_edward) ? creep
Call: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, prince_andrew) ? creep
Fail: (18) born_after(prince_edward, prince_andrew) ? creep
Redo: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, _44656) ? creep
Fail: (18) born_after(prince_edward, _44656) ? creep
Fail: (17) born_after_x(prince_edward, prince_andrew) ? creep
Fail: (16) born_after_x(prince_andrew, prince_andrew) ? creep
Redo: (17) male(_90) ? creep
Exit: (17) male(prince_edward) ? creep
Exit: (16) same_gender(prince_andrew, prince_edward) ? creep
Call: (16) born_after_x(prince_andrew, prince_edward) ? creep
Call: (17) born_after(prince_andrew, prince_edward) ? creep
Exit: (17) born_after(prince_andrew, prince_edward) ? creep
Exit: (16) born_after_x(prince_andrew, prince_edward) ? creep
Exit: (15) same_g_younger(prince_andrew, prince_edward) ? creep
^ Call: (15) not(crown(prince_andrew)) ? creep

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Call: (16) crown(prince_andrew) ? creep
Fail: (16) crown(prince_andrew) ? creep
^ Exit: (15) not(user:crown(prince_andrew)) ? creep
^ Call: (15) not(crown(prince_edward)) ? creep
Call: (16) crown(prince_edward) ? creep
Fail: (16) crown(prince_edward) ? creep
^ Exit: (15) not(user:crown(prince_edward)) ? creep
Exit: (14) order_r_helper(prince_andrew, prince_edward) ? creep
Call: (14) order_r(prince_edward, _96) ? creep
Call: (15) order_r_helper(prince_edward, _62508) ? creep
Call: (16) same_g_younger(prince_edward, _62508) ? creep
Call: (17) same_gender(prince_edward, _62508) ? creep
Call: (18) male(prince_edward) ? creep
Exit: (18) male(prince_edward) ? creep
Call: (18) male(_62508) ? creep
Exit: (18) male(prince_charles) ? creep
Exit: (17) same_gender(prince_edward, prince_charles) ? creep
Call: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, prince_charles) ? creep
Fail: (18) born_after(prince_edward, prince_charles) ? creep
Redo: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, _4042) ? creep
Fail: (18) born_after(prince_edward, _4042) ? creep
Fail: (17) born_after_x(prince_edward, prince_charles) ? creep
Redo: (18) male(_116) ? creep
Exit: (18) male(prince_andrew) ? creep
Exit: (17) same_gender(prince_edward, prince_andrew) ? creep
Call: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, prince_andrew) ? creep
Fail: (18) born_after(prince_edward, prince_andrew) ? creep
Redo: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, _12136) ? creep
Fail: (18) born_after(prince_edward, _12136) ? creep
Fail: (17) born_after_x(prince_edward, prince_andrew) ? creep
Redo: (18) male(_116) ? creep
Exit: (18) male(prince_edward) ? creep
Exit: (17) same_gender(prince_edward, prince_edward) ? creep
Call: (17) born_after_x(prince_edward, prince_edward) ? creep
Call: (18) born_after(prince_edward, prince_edward) ? creep
Fail: (18) born_after(prince_edward, prince_edward) ? creep
Redo: (17) born_after_x(prince_edward, prince_edward) ? creep
Call: (18) born_after(prince_edward, _20230) ? creep
Fail: (18) born_after(prince_edward, _20230) ? creep
Fail: (17) born_after_x(prince_edward, prince_edward) ? creep
Redo: (17) same_gender(prince_edward, _116) ? creep
Call: (18) female(prince_edward) ? creep
Fail: (18) female(prince_edward) ? creep
Fail: (17) same_gender(prince_edward, _116) ? creep
Fail: (16) same_g_younger(prince_edward, _116) ? creep
Redo: (15) order_r_helper(prince_edward, _116) ? creep
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Call: (16) diff_g(prince_edward, _116) ? creep
Call: (17) male(prince_edward) ? creep
Exit: (17) male(prince_edward) ? creep
Call: (17) female(_116) ? creep
Exit: (17) female(queen_elizabeth) ? creep
Exit: (16) diff_g(prince_edward, queen_elizabeth) ? creep
^ Call: (16) not(crown(prince_edward)) ? creep
Call: (17) crown(prince_edward) ? creep
Fail: (17) crown(prince_edward) ? creep
^ Exit: (16) not(user:crown(prince_edward)) ? creep
^ Call: (16) not(crown(queen_elizabeth)) ? creep
Call: (17) crown(queen_elizabeth) ? creep
Exit: (17) crown(queen_elizabeth) ? creep
^ Fail: (16) not(user:crown(queen_elizabeth)) ? creep
Redo: (17) female(_116) ? creep
Exit: (17) female(princess_ann) ? creep
Exit: (16) diff_g(prince_edward, princess_ann) ? creep
^ Call: (16) not(crown(prince_edward)) ? creep
Call: (17) crown(prince_edward) ? creep
Fail: (17) crown(prince_edward) ? creep
^ Exit: (16) not(user:crown(prince_edward)) ? creep
^ Call: (16) not(crown(princess_ann)) ? creep
Call: (17) crown(princess_ann) ? creep
Fail: (17) crown(princess_ann) ? creep
^ Exit: (16) not(user:crown(princess_ann)) ? creep
Exit: (15) order_r_helper(prince_edward, princess_ann) ? creep
Call: (15) order_r(princess_ann, _122) ? creep
Call: (16) order_r_helper(princess_ann, _49434) ? creep
Call: (17) same_g_younger(princess_ann, _49434) ? creep
Call: (18) same_gender(princess_ann, _49434) ? creep
Call: (19) male(princess_ann) ? creep
Fail: (19) male(princess_ann) ? creep
Redo: (18) same_gender(princess_ann, _49434) ? creep
Call: (19) female(princess_ann) ? creep
Exit: (19) female(princess_ann) ? creep
Call: (19) female(_49434) ? creep
Exit: (19) female(queen_elizabeth) ? creep
Exit: (18) same_gender(princess_ann, queen_elizabeth) ? creep
Call: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Call: (19) born_after(princess_ann, queen_elizabeth) ? creep
Fail: (19) born_after(princess_ann, queen_elizabeth) ? creep
Redo: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Call: (19) born_after(princess_ann, _61570) ? creep
Exit: (19) born_after(princess_ann, prince_andrew) ? creep
Call: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Call: (20) born_after(prince_andrew, queen_elizabeth) ? creep
Fail: (20) born_after(prince_andrew, queen_elizabeth) ? creep
Redo: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Call: (20) born_after(prince_andrew, _66432) ? creep
Exit: (20) born_after(prince_andrew, prince_edward) ? creep

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Call: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Call: (21) born_after(prince_edward, queen_elizabeth) ? creep
Fail: (21) born_after(prince_edward, queen_elizabeth) ? creep
Redo: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Call: (21) born_after(prince_edward, _3168) ? creep
Fail: (21) born_after(prince_edward, _3168) ? creep
Fail: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Fail: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Fail: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Redo: (19) female(_128) ? creep
Exit: (19) female(princess_ann) ? creep
Exit: (18) same_gender(princess_ann, princess_ann) ? creep
Call: (18) born_after_x(princess_ann, princess_ann) ? creep
Call: (19) born_after(princess_ann, princess_ann) ? creep
Fail: (19) born_after(princess_ann, princess_ann) ? creep
Redo: (18) born_after_x(princess_ann, princess_ann) ? creep
Call: (19) born_after(princess_ann, _12882) ? creep
Exit: (19) born_after(princess_ann, prince_andrew) ? creep
Call: (19) born_after_x(prince_andrew, princess_ann) ? creep
Call: (20) born_after(prince_andrew, princess_ann) ? creep
Fail: (20) born_after(prince_andrew, princess_ann) ? creep
Redo: (19) born_after_x(prince_andrew, princess_ann) ? creep
Call: (20) born_after(prince_andrew, _17744) ? creep
Exit: (20) born_after(prince_andrew, prince_edward) ? creep
Call: (20) born_after_x(prince_edward, princess_ann) ? creep
Call: (21) born_after(prince_edward, princess_ann) ? creep
Fail: (21) born_after(prince_edward, princess_ann) ? creep
Redo: (20) born_after_x(prince_edward, princess_ann) ? creep
Call: (21) born_after(prince_edward, _22606) ? creep
Fail: (21) born_after(prince_edward, _22606) ? creep
Fail: (20) born_after_x(prince_edward, princess_ann) ? creep
Fail: (19) born_after_x(prince_andrew, princess_ann) ? creep
Fail: (18) born_after_x(princess_ann, princess_ann) ? creep
Fail: (17) same_g_younger(princess_ann, _128) ? creep
Redo: (16) order_r_helper(princess_ann, _128) ? creep
Call: (17) diff_g(princess_ann, _128) ? creep
Call: (18) male(princess_ann) ? creep
Fail: (18) male(princess_ann) ? creep
Fail: (17) diff_g(princess_ann, _128) ? creep
Fail: (16) order_r_helper(princess_ann, _128) ? creep
Redo: (15) order_r(princess_ann, _122) ? creep
Call: (16) order_r_helper(princess_ann, _122) ? creep
Call: (17) same_g_younger(princess_ann, _122) ? creep
Call: (18) same_gender(princess_ann, _122) ? creep
Call: (19) male(princess_ann) ? creep
Fail: (19) male(princess_ann) ? creep
Redo: (18) same_gender(princess_ann, _122) ? creep
Call: (19) female(princess_ann) ? creep
Exit: (19) female(princess_ann) ? creep
Call: (19) female(_122) ? creep

Exit: (19) female(queen_elizabeth) ? creep
Exit: (18) same_gender(princess_ann, queen_elizabeth) ? creep
Call: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Call: (19) born_after(princess_ann, queen_elizabeth) ? creep
Fail: (19) born_after(princess_ann, queen_elizabeth) ? creep
Redo: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Call: (19) born_after(princess_ann, _45256) ? creep
Exit: (19) born_after(princess_ann, prince_andrew) ? creep
Call: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Call: (20) born_after(prince_andrew, queen_elizabeth) ? creep
Fail: (20) born_after(prince_andrew, queen_elizabeth) ? creep
Redo: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Call: (20) born_after(prince_andrew, _50118) ? creep
Exit: (20) born_after(prince_andrew, prince_edward) ? creep
Call: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Call: (21) born_after(prince_edward, queen_elizabeth) ? creep
Fail: (21) born_after(prince_edward, queen_elizabeth) ? creep
Redo: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Call: (21) born_after(prince_edward, _54980) ? creep
Fail: (21) born_after(prince_edward, _54980) ? creep
Fail: (20) born_after_x(prince_edward, queen_elizabeth) ? creep
Fail: (19) born_after_x(prince_andrew, queen_elizabeth) ? creep
Fail: (18) born_after_x(princess_ann, queen_elizabeth) ? creep
Redo: (19) female(_122) ? creep
Exit: (19) female(princess_ann) ? creep
Exit: (18) same_gender(princess_ann, princess_ann) ? creep
Call: (18) born_after_x(princess_ann, princess_ann) ? creep
Call: (19) born_after(princess_ann, princess_ann) ? creep
Fail: (19) born_after(princess_ann, princess_ann) ? creep
Redo: (18) born_after_x(princess_ann, princess_ann) ? creep
Call: (19) born_after(princess_ann, _64694) ? creep
Exit: (19) born_after(princess_ann, prince_andrew) ? creep
Call: (19) born_after_x(prince_andrew, princess_ann) ? creep
Call: (20) born_after(prince_andrew, princess_ann) ? creep
Fail: (20) born_after(prince_andrew, princess_ann) ? creep
Redo: (19) born_after_x(prince_andrew, princess_ann) ? creep
Call: (20) born_after(prince_andrew, _1458) ? creep
Exit: (20) born_after(prince_andrew, prince_edward) ? creep
Call: (20) born_after_x(prince_edward, princess_ann) ? creep
Call: (21) born_after(prince_edward, princess_ann) ? creep
Fail: (21) born_after(prince_edward, princess_ann) ? creep
Redo: (20) born_after_x(prince_edward, princess_ann) ? creep
Call: (21) born_after(prince_edward, _6320) ? creep
Fail: (21) born_after(prince_edward, _6320) ? creep
Fail: (20) born_after_x(prince_edward, princess_ann) ? creep
Fail: (19) born_after_x(prince_andrew, princess_ann) ? creep
Fail: (18) born_after_x(princess_ann, princess_ann) ? creep
Fail: (17) same_g_younger(princess_ann, _122) ? creep
Redo: (16) order_r_helper(princess_ann, _122) ? creep
Call: (17) diff_g(princess_ann, _122) ? creep

Call: (18) male(princess_ann) ? creep
Fail: (18) male(princess_ann) ? creep
Fail: (17) diff_g(princess_ann, _122) ? creep
Fail: (16) order_r_helper(princess_ann, _122) ? creep
Fail: (15) order_r(princess_ann, _122) ? creep
Redo: (14) order_r(prince_edward, _96) ? creep
Call: (15) order_r_helper(prince_edward, _96) ? creep
Call: (16) same_g_younger(prince_edward, _96) ? creep
Call: (17) same_gender(prince_edward, _96) ? creep
Call: (18) male(prince_edward) ? creep
Exit: (18) male(prince_edward) ? creep
Call: (18) male(_96) ? creep
Exit: (18) male(prince_charles) ? creep
Exit: (17) same_gender(prince_edward, prince_charles) ? creep
Call: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, prince_charles) ? creep
Fail: (18) born_after(prince_edward, prince_charles) ? creep
Redo: (17) born_after_x(prince_edward, prince_charles) ? creep
Call: (18) born_after(prince_edward, _27358) ? creep
Fail: (18) born_after(prince_edward, _27358) ? creep
Fail: (17) born_after_x(prince_edward, prince_charles) ? creep
Redo: (18) male(_96) ? creep
Exit: (18) male(prince_andrew) ? creep
Exit: (17) same_gender(prince_edward, prince_andrew) ? creep
Call: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, prince_andrew) ? creep
Fail: (18) born_after(prince_edward, prince_andrew) ? creep
Redo: (17) born_after_x(prince_edward, prince_andrew) ? creep
Call: (18) born_after(prince_edward, _35452) ? creep
Fail: (18) born_after(prince_edward, _35452) ? creep
Fail: (17) born_after_x(prince_edward, prince_andrew) ? creep
Redo: (18) male(_96) ? creep
Exit: (18) male(prince_edward) ? creep
Exit: (17) same_gender(prince_edward, prince_edward) ? creep
Call: (17) born_after_x(prince_edward, prince_edward) ? creep
Call: (18) born_after(prince_edward, prince_edward) ? creep
Fail: (18) born_after(prince_edward, prince_edward) ? creep
Redo: (17) born_after_x(prince_edward, prince_edward) ? creep
Call: (18) born_after(prince_edward, _43546) ? creep
Fail: (18) born_after(prince_edward, _43546) ? creep
Fail: (17) born_after_x(prince_edward, prince_edward) ? creep
Redo: (17) same_gender(prince_edward, _96) ? creep
Call: (18) female(prince_edward) ? creep
Fail: (18) female(prince_edward) ? creep
Fail: (17) same_gender(prince_edward, _96) ? creep
Fail: (16) same_g_younger(prince_edward, _96) ? creep
Redo: (15) order_r_helper(prince_edward, _96) ? creep
Call: (16) diff_g(prince_edward, _96) ? creep
Call: (17) male(prince_edward) ? creep
Exit: (17) male(prince_edward) ? creep

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Call: (17) female(_96) ? creep
Exit: (17) female(queen_elizabeth) ? creep
Exit: (16) diff_g(prince_edward, queen_elizabeth) ? creep
^ Call: (16) not(crown(prince_edward)) ? creep
Call: (17) crown(prince_edward) ? creep
Fail: (17) crown(prince_edward) ? creep
^ Exit: (16) not(user:crown(prince_edward)) ? creep
^ Call: (16) not(crown(queen_elizabeth)) ? creep
Call: (17) crown(queen_elizabeth) ? creep
Exit: (17) crown(queen_elizabeth) ? creep
^ Fail: (16) not(user:crown(queen_elizabeth)) ? creep
Redo: (17) female(_96) ? creep
Exit: (17) female(princess_ann) ? creep
Exit: (16) diff_g(prince_edward, princess_ann) ? creep
^ Call: (16) not(crown(prince_edward)) ? creep
Call: (17) crown(prince_edward) ? creep
Fail: (17) crown(prince_edward) ? creep
^ Exit: (16) not(user:crown(prince_edward)) ? creep
^ Call: (16) not(crown(princess_ann)) ? creep
Call: (17) crown(princess_ann) ? creep
Fail: (17) crown(princess_ann) ? creep
^ Exit: (16) not(user:crown(princess_ann)) ? creep
Exit: (15) order_r_helper(prince_edward, princess_ann) ? creep
Exit: (14) order_r(prince_edward, princess_ann) ? creep
Exit: (13) order_r(prince_andrew, [prince_edward, princess_ann]) ? creep
Exit: (12) order_r(prince_charles, [prince_andrew, [prince_edward, pr
Exit: (11) order([prince_charles, prince_andrew, prince_edward, prince:
Exit: (10) get_order([prince_charles, prince_andrew, prince_edward, pr
X = [prince_charles, prince_andrew, prince_edward, princess_ann] .

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